Railroad Age Gazette

Including the Railroad Gazette and The Railway Age

PUBLISHED EVERY FRIDAY BY
THE RAILROAD GAZETTE (INC.), 83 FULTON STREET, NEW YORK.

CHICAGO: 160 Harrison St. PITTSBURGH: Farmers' Bank Bldg.
LONDON: Queen Anne's Chambers, Westminster.

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The address of the company is the address of the officers.

Subscription, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free.

United States and Mexico.....$5.00 a year
Canada.....$6.00 a year
Foreign Edition, London.....£1 12*s.* ($8.00) a year
Single Copies.....15 cents each

Entered at the Post Office at New York as mail matter of the second class.

VOL. XLVI., No. 18. FRIDAY, APRIL 30, 1909.

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The rail specifications adopted by the steel manufacturers of the United States and Canada for 1909, which are practically the same for the different companies, indicate the views of the rail makers as to the proper tests and chemical composition for securing good rails, and are comparable with the main features of the rail specifications of some of the principal railways, which were published in this paper March 19, page 535. The drop test of the manufacturers for 90-lb. and 100-lb. rails is reduced in height from 19 ft., in their previous specification, to 18 ft. in the present one, and the new clause relating to the temperature of the drop test piece makes the minimum limit 60 deg. F. and the maximum 120 deg. F. The anvil block must weigh at least 20,000 lbs., but nothing is said of the character of the foundation, which is of much importance in making drop tests which shall be in all respects comparable. If the first piece breaks two re-tests are allowed, and if either of these fail all rails of the blow which they represent will be rejected, and if both meet the requirements they are accepted. The A. S. C. E. sections are still officially regarded as standard practice. The chemical specification for Bessemer rails of 90 and 100-lb. section make the carbon limits 0.45 to 0.55; phosphorus not over 1.10 and manganese 0.84 to 1.14. No. 2 rails shall not be accepted if they have flaws in the head more than ¼ in. or in the flange more than ½ in. in depth. For open hearth rails the physical conditions, drop tests and inspection are the same as for Bessemer rails. The chemical requirements for 90-lb. and 100-lb. rails are carbon 0.62 to 0.75; phosphorus not over 0.04; manganese 0.60 to 0.90. The chemical requirements for Bessemer and open hearth rails are not very different from those recommended by the American Railway Association committee in its report of a year ago, except that the manufacturers do not include any limits for sulphur, and in the A. R. A. report this element is limited to 0.06 for open hearth and 0.075 for Bessemer. These limits are probably higher than they should be. Manganese sulphide, in certain forms, is a harmful constituent of steel.

THE RULES OF CAR INTERCHANGE.

The Master Car Builders' Rules for the Interchange of Cars have grown with annual accretions until they now fill 60 pages of the published Proceedings of the Association. The magnitude of the business of car inspection in prosperous years is such as to require large numbers of car inspectors; yet at such times the men often find more attractive employment at better wages. New and unschooled car inspectors are then employed and the quality of the work deteriorates. Even the older and more experienced men find increasing difficulty in interpreting the rules, and there is a demand for a simpler classification which shall divide the code, and arrange those rules which fix the responsibility of the delivering line under one heading, and those relating to defects chargeable against car owners under another. It has been suggested that rules pertaining to defects for which the delivering line is responsible should be placed first so that interchange inspectors could learn and understand them thoroughly; then they would not have to study and memorize all the rules in order to understand those affecting their particular part of the business. All that they would have to know would be the conditions which make a car safe to go over the line according to the instructions of superior foremen, and for what defects the delivering line is responsible. A simple and clear cut fixing of responsibility would save a great deal of time, many disputes and much delay to freight movement.

The spirit which governs the April meetings of the railway clubs often is that of making as few changes as possible, and the changes proposed usually affect only details. These recommendations are apt to be based on local experience, which may be comparatively narrow, and the larger interests affecting national and international interchange are sometimes overlooked. The broader view necessary for such a treatment can be obtained by a study of the more complete statistics now available; and a new influence is seen in the work of the Executive Committee of the Chief Joint Car Inspectors' and Car Foremen's Association.

When the interchange rules were first adopted there were comparatively few cars; the western country was not developed and freight cars did not go so far from home. The proper maintenance of cars was obtained by rules which put the burden of responsibility on the delivering line, and their operation continued to be satisfactory until the number of cars and the distances they went from home became too great. Frequent delays to traffic, disputes over bills and general confusion then compelled the radical revision of the rules. This was in 1896. Car owners were then made responsible for and chargeable with all those repairs made to their cars when away from home, which were necessitated by ordinary wear and tear in fair service, and cards were not required for any defects thus arising. Railways handling cars were made responsible for damage by unfair usage, derailment, accident or improper repairs, and they were required to make such repairs at their own expense or issue a defect card acknowledging responsibility for such damage.

This statement of the division of responsibility remains in

the last revision of the Code of Rules; but there is now a tendency to reduce the responsibility of the delivering line and to increase the list of defects chargeable against the car owner. It appears that in spite of all the discussion and revision of the past 15 years the division of this responsibility has not yet been so clearly defined as to prevent confusion and frequent dissatisfaction. The Chief Joint Car Inspectors, at their recent meeting in Cleveland, passed resolutions to the effect that there is no benefit gained by making the delivering line responsible for defects for which the owner is chargeable, if the car is in interchange. The maintenance of equipment is not thus best accomplished, while the practice makes a large amount of work in tracing and in giving cards for defects which are chargeable to the owner. At nearly every important interchange point the practice of issuing cards against delivering lines for owners' defects is being largely discontinued on the ground that it is more equitable to omit them. If such practice is fair at the larger cities it should be fair everywhere, and the rules should be modified so as to authorize it.

The Chief Joint Car Inspectors have made an important recommendation in regard to Rule 125, which deals with worn-out cars on foreign roads. Under the present rule a car unsafe to load on account of general worn-out condition due to age or decay, is returned to the owner on a home card which states the defects and shows the proper route. The rule answered a good purpose when cars did not get far from home; but at present worn-out wooden cars are found thousands of miles from home, and the return of such a car is an expensive and dangerous operation. It cannot be loaded and the long, empty haul is a useless expense. If mixed with strong steel cars in a long train it becomes an element of danger; and such cars cause wrecks. A railway is seldom able to get such a car over its line without having to stop it at different repair tracks, whereas, if it had been rebuilt or thoroughly repaired before it became unserviceable, it could have been put into revenue service instead of being started on the long and dangerous empty haul.

The joint car inspectors have recommended that Rules 125 and 126 be changed to read as follows:

Rule 125. "All wooden frame cars that a road has in its possession in an unserviceable condition, and it is desirous of procuring redress from the owners, may call in a disinterested person, such as car department head of a disinterested line, or his representative, or a chief joint car inspector, who is employed by four or more lines, who shall examine the car and, if he finds that the defects are such that the owners are responsible, he shall write to the owners, stating all defects, sending a copy to the road calling him in. The owners shall decide whether the car shall be repaired or dismantled at their expense; if the owner elects to have the car dismantled or destroyed, and the car is a 60,000 lbs. capacity car or over, the road destroying the car shall allow the owner second-hand price for wheels or axles, full price for air brakes, and scrap metal prices for all other metal. If the car is of less than 60,000 lbs. capacity, the road destroying it will allow the owners full price for air brakes, second-hand price for wheels, and scrap price for all other metal."

Rule 126. "A metal car that is safe to run, which on account of accident or serious damage by wreck or otherwise or from defects due from ordinary wear and tear, shall be reported to its owners, as provided by Rule 125; and the owner shall state whether the car shall be sent home or destroyed. In case he elects to have the car sent home, the road having the car in its possession shall make same safe for trainmen as provided for in Interstate Commerce Rules, and shall place an M. C. B. Defect Card on car for all defects for which the delivering road is responsible."

The wording of the proposed changes in these two rules could be improved, but rules giving effect to their spirit and purpose seem desirable. There are now over two million freight cars in interchange traffic. The records of the Car Efficiency Committee show that on an average 40 per cent. of these are on foreign roads; and the Rules of Interchange are applied over a large territory. As the number of heavy steel cars increases, the need of keeping crippled wooden cars out of long and heavy trains grows more acute. When a car has become practically scrap it should be made scrap, wherever it is, and settled for as such; and not dragged around the country, a source of delay to traffic and of danger to trains on every line over which it moves.

SAVINGS BANK INVESTMENTS IN RAILWAYS.

The returns of the 1,453 savings banks of the United States showed that they had in 1908 a total of $618,193,415 invested in railway stocks and bonds, chiefly bonds. Their railway investments formed more than 16 per cent. of their total resources of $3,809,533,000; and in two years the railway investments had increased from $346,561,192 to $618,193,415, or almost 80 per cent., while the leading form of savings bank investment, realty mortgages, increased only from $1,323,729,810 to $1,440,061,503, or less than 9 per cent., in the same time. To the savings banks investments in railways must also be added the vast but indefinite railway holdings of corporative and private trustees who, in not a few states, must invest under the savings bank statutes. There is now every indication that railway investment in the various trust forms —including the savings banks—is increasing swiftly in its ratios to other holdings. The great sales of railway bonds in the market is one of its indices; and the exceptional prominence and frequency on the advertising circular with which the "legal for savings banks" in various states is annexed to the offered bond is another and significant sign. In the category of investment forces which act as absorbent on the conservative group of railway securities the savings bank must be ranked not only as the first but as increasing its lead. And the savings banks not only buy railway securities but, as a rule, hold them to maturity.

At such a time and when a good many legislatures are in session with many savings bank bills before them the statutes of railway investment become a subject of special interest. It may be noted in passing that two eastern states—Rhode Island and Massachusetts—have recently revised and extended their savings bank investment laws. Rhode Island, strange to say, up to last year had practically no bars up against any railway investment whatsoever. An institution for savings in that state could invest "in such corporate stock or bonds" as the managers "may deem safe and secure," for which has been substituted under the new act the requirement of 4 per cent. dividends for five years preceding in the case of the railway note, and, in the case of the railway bond, the earning of not less than twice the interest charge on the bond after operation, maintenance, taxes and guaranteed interest and dividends have been paid. Rhode Island has thus leaped from ultra looseness to rigid conservatism—probably the sequel of her harsh experiences of a panic twelvemonth. Massachusetts, a state rather severe heretofore in such matters and pretty severe still, has, on other other hand, revised the savings bank investment law in the direction of liberality and expansion. One feature singular in its outworking she retains by which new bonds become illegal for investment if outstanding debt of a railway exceeds capital stock. The Massachusetts theory is obvious enough. The capital stock—assumed always to have been paid in—is classed as a protective equity over the bond. But the new bond may be the highest type of railway security. It may be a bond refunding a senior mortgage. It may be a gilt edged bond on a subsidiary line from which all the stock has been retired. It may be a senior bond in actual valuation far and away ahead of earlier issues yet illegal for savings banks of the state while the inferior but earlier bond—or note—is legal. In fact, $5,000,000 of one-year notes of the New Haven railway company have just been declared legal for the Massachusetts banks under a special exemption of the state law. Yet a Massachusetts savings bank cannot buy a new first mortgage bond on the New Haven's main stem, upon which, at present, there are no mortgage bonds outstanding.

This Massachusetts case shows the absurdity to which, now and then, a general investment statute relating to savings

banks may lead and points at the higher value of the "specific mention statute" which names the conservative and dividend paying railway lines whose securities—exclusive of stock—are open to the banks. But the "specific" idea also strikes its rocks. Its worst evil, perhaps, is its direct tendency to lobby the specified security upon the valid list. An actual and illustrative case can be cited. Some four years ago a new railway line of considerable length and fair promise was opened in the Central West. Financial interests seeking a market for its bonds—on commission—after considerable opposition succeeded in working the bonds on to the savings bank "specific" list of a highly capitalized eastern state. The bonds ere long defaulted and are in default still though likely in the end to make good. But under the general law of the state in question they would have been excluded and the case stands as a bad instance and worse precedent.

About two-thirds of the deposits of the regular savings banks of the country are in New England and New York state, and in that eastern region the tendencies of the statutes bearing upon investment in railways is of prime importance. One distinct tendency is shown by the fact that within the last three years four New England states have practically revised the investment law to meet changed and changing railway conditions. The drift of the statutes may be briefly expressed as follows: (1) Favor for the securities of the railways within the state or chartered by it and extending within the state. (2) Restriction to mortgage bonds—usually to the senior mortgage—but with allowance for refunding and "consolidated" bonds. (3) A minimum limitation of the ratio of outstanding stock to outstanding debt, usually not less than one-third. (4) A general restriction to roads that have paid dividends for a continuous series of years previous to the date of the savings banks railway investment. (5) A strong tendency to subdivide the roads and their securities into investment classes. (6) Extension of savings banks investment to street railway bonds with favor for those within the state in some cases subject to the approval of a state officer, and (7) a specific list named almost always of strong dividend paying roads and large systems. In their main features most of these provisions are old but nearly all of them have been within a very few years amended. Very noteworthy is the tendency to favor the domestic roads. Saying nothing of the influence of such lines on investment legislation such favor is based in human nature and has at least the vantage that the local railway credit and security can be more easily watched.

In seeking the ideal savings bank investment law for railway securities and a statute which will at the same time protect the depositor and be just to the railway companies the great obstacle is encountered of wide variants in the security which cannot be met by general law. The debenture of one company may be better than the first mortgage bond of another. In a panic year a railway corporation whose bonds are all gilt-edged or silver-edged may wisely drop a dividend or two, yet by that fact exclude itself for some years from the "continuous dividend" requirement that opens its bonds to the banks. It may thus be tempted to maintain its dividend unwisely so as to retain the savings bank investment privilege. A savings bank law for the railways should be rigid enough to supply the fundamental safeguards yet flexible enough to meet exceptions. Such flexibility could theoretically rest on the individual judgment of a state officer or body of officers. But there one finds that same danger of intrusion of politics "pull" and incompetency which has sapped the functions of so many railway commissions. The solution of the problem must be left to time and experience. Meantime there is in the foreground of the question the cheering facts that the splendid record of the savings banks attests the investing judgment of their fiscal managers; that under existing laws railway investment has been large, has increased and is still increasing; and that, spite of some anomalies, the drift of new statute-making is toward the investment conservatism that benefits alike the railway and the bank which "digests" the railway security. The effect of railway consolidation in strengthening subsidiary securities and opening them more and more to savings bank purchase is another feature to be marked and emphasized.

Finally there is what may be called a territorial suggestion not without its deep meanings in the future. New York and New England have pretty restrictive savings bank investment laws. They have about two-thirds of the regular savings bank deposits of the country and absorb their hundreds of millions of railway holdings. The rest of the states, some of them very rich and highly capitalized, have, with few exceptions, loose investment laws—or no laws at all—and only a third of the savings banks deposits. As financial conservatism reaches southward and westward, albeit slowly, are we not to see the savings bank system of the East duplicated there and corresponding expansion of the area and volume of the absorbed railway security?

PROPOSED ELECTRIFICATION OF PART OF THE GRAND TRUNK PACIFIC.

The resolutions that were introduced in the legislature of New Brunswick the week before last and carried unanimously, regarding the electrification of that portion of the Grand Trunk Pacific Railway lying between the St. Lawrence river and Moncton, are interesting as indicative of the growing confidence in the possibility of electric traction. As was stated in the preamble to the resolutions, the immediate reason for discussing the subject was a desire to protect from fire the forest areas through which the road passes. The conservation and preservation of the forests of Canada have become live topics in Canadian politics, and both parties are united in working toward that end. The resolutions suggest a conference in which the province of Quebec is invited to join, and, from the influence that is back of the movement, it seems fair to expect that such a conference will be held, and that the subject of electrification will be duly and carefully considered.

The proposal to electrify the Grand Trunk Pacific between the St. Lawrence river and Moncton is the most ambitious scheme that has yet been proposed, as far as mileage is concerned. The distance between the two points named is about 459 miles, and much of the line passes through dense forests of spruce and fir in lower Quebec and northern New Brunswick, as well as through a rich farming country along the upper St. John. Starting from the St. Lawrence, the location of the road lies through a rather heavy, rolling country with a ruling grade eastbound of 0.4 per cent. and one westbound of 0.6 per cent. At one point in each direction there are stretches of 7 and 10 miles, respectively, where the grade rises to 1.10 per cent. Under any system of operation, either electric or steam, economical work will demand the use of a pusher at these points. In steam operation this will require at least two locomotives with their complete equipment of crews, besides the establishment and maintenance of coal and water stations that would not otherwise be needed, or else a large extra mileage to procure these supplies. With electric haulage two locomotives will also be required, to be sure, but their operation on the multiple unit control will do away with the extra crews on the pusher grades as well as the coal and water stations.

It is not probable that even the most enthusiastic of legislative electricians would have considered such a recommendation had not a water power sufficient to develop a current for the whole road been available on the line. This water power is located at Grand Falls on the St. John river, 269 miles from the St. Lawrence and 160 miles from Moncton, not far from the central point. At this place the river has a natural fall of about 120 ft. and a flow that has been estimated to be sufficient to furnish from 100,000 to 125,000 h.p. continu-

ously, by the utilization of comparatively inexpensive means of storage and conservation in the lakes tributary to the St. John. These lakes have a large area, and this, with the comparatively short period of low water, it is claimed, will maintain the flow at the figure named. As the requirements of the road have been estimated at 40,000 h.p., it looks as if an ample supply would be available.

The movement to utilize this water power for the railway is backed up by another impulse in addition to that of forest protection; the further conservation of the somewhat scanty coal supply of the country. This section is dependent upon the Dominion coal of Nova Scotia or upon that imported from the United States. The area of the Nova Scotia coal fields is limited, and beyond this there is nothing available. The coal is of good quality and ranks with the Pittsburgh and eastern Ohio output, and it is, therefore, of the first importance that it should not be wasted.

Thus there are two reasons why the whole country is interested in the decision. It is looked upon as a national undertaking, and will certainly receive careful attention. The work of the electric locomotives of the New York Central, New York, New Haven & Hartford, Baltimore & Ohio, the Grand Trunk at the St. Clair tunnel, the Valtellina Railway, the Simplon tunnel and elsewhere, have shown conclusively that so far as the mechanical and electrical elements are concerned, heavy traffic can be handled by electric locomotives. The system used must undoubtedly be a high tension alternating current for the distances involved.

The real crux of the whole matter lies not in the mechanical but in the commercial possibility of the scheme. The outlay for the railway company will consist mainly of transmission lines and equipment, for it is proposed to purchase the power outright, at a fixed price, from a development company. It remains to be seen whether, with 64 per cent. of the number of steam locomotives required when commuted to electrical machines, plus the transmission lines, minus the saving effected in power, the cost will be more or less than that of steam operation. We guess it will be more, but under the conditions presented it looks as though the proposed installation would be well worth a most thorough and careful investigation.

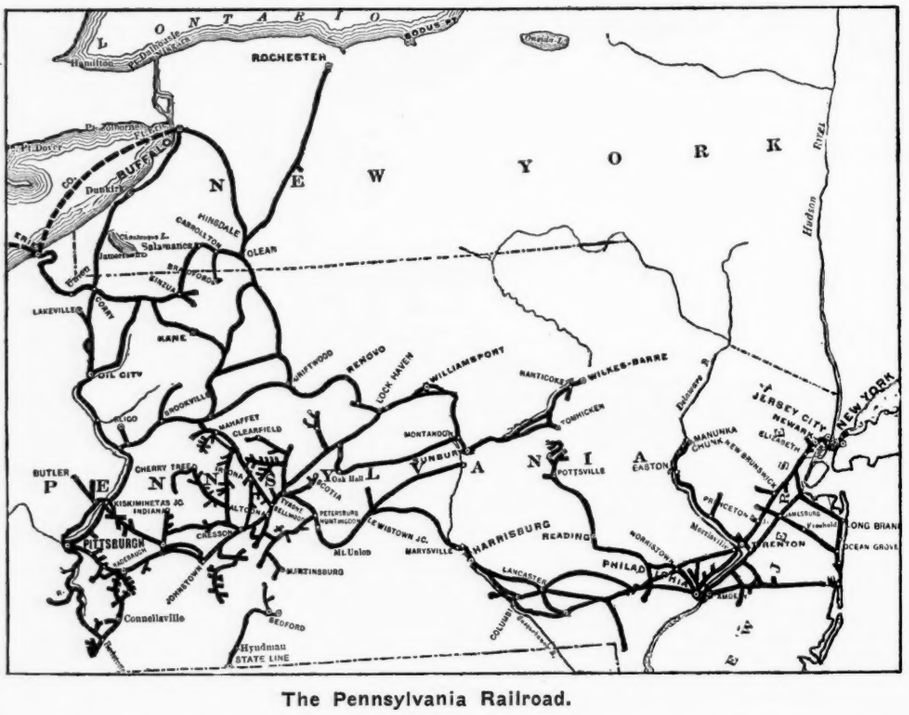
In presenting the case to the Canadian public, the reasonable claim is made that electrification would materially expedite freight traffic, because it would eliminate stops for water and reduce engine charges, while during the periods of intense cold that characterize the New Brunswick and Quebec winters the efficiency of the steam locomotive is much reduced, but the efficiency of the electric locomotive would be increased.

The plan is a large one; larger than that suggested for immediate and initial electrification of any other proposed for this continent, and ranks with the reported contemplation of Sweden to electrify all the railways in the southern part of the country; with the proposals before the Swiss Federation, and with those applying to northern Italy. In each of these instances there is an ample water power available for the generation of the current, and in each the promotors turn squarely away from the Aspinall rule, and propose electrification to save money, instead of to make money.

PENNSYLVANIA RAILROAD.

So great and so diversified is the tonnage carried by the Pennsylvania Railroad, the operating company for the lines east of Pittsburgh, that local causes affecting only certain classes of business would hardly be reflected at all in the grand total of freight carried by the company. For instance, there might be a general shortage, even of crops, without a reduction in the total tonnage of the Pennsylvania by more than a very small per cent. On the other hand, as we pointed out in an article in last week's issue of the *Railroad Age Gazette*, the business of such an enormous concern as the Pennsylvania shows with the greatest accuracy the effect of the unprosperous year of 1908 on railway earnings and business. All lines directly operated carried a total tonnage of revenue freight of 182,000,000 tons in 1908, or 41,700,000 tons less than in 1907.

The Pennsylvania is the great Pittsburgh road, 65.5 per cent. of its tonnage last year was products of mines, and although the falling off in tonnage of such classes of freight may not



The Pennsylvania Railroad.

for a short period of time be a true index of business conditions, yet over a period as long as a year they probably tell a truthful story. The tonnage of coke especially varies directly and quite closely with the activity in manufacturing centers. In 1908, 12,000,000 tons of coke were carried by the Pennsylvania as against 19,500,000 tons in 1907, and 75,600,000 tons of bituminous coal, the tonnage of which quite directly varies with business prosperity, was carried in 1908 as against 82,000,000 tons in 1907.

Under the head of manufactures the same heavy decreases in tonnage are noticed, and it is only in the tonnage of food stuffs, such as the products of agriculture and products of animals, that the decreases are comparatively small or in which there are increases.

The loss in tonnage and the consequent loss in revenue hit the Pennsylvania exceptionally hard, because there were no alleviating circumstances. For instance, the road was well managed and economically operated in 1907 so that it was not possible to make up in increased efficiency what was lost from smaller business; nor were there any recent improvements from which the road could benefit in 1908 enough to offset decreased gross earnings. It therefore had to cut down operat-

ing expenses where it could, chiefly in maintenance of way and maintenance of equipment, and for the rest, pay its stockholders a smaller dividend, 6 per cent. in 1908 as against 7 per cent. in 1907, and make smaller outlays for improvements and additions.

Gross earnings were $136,300,000 last year as against $164,800,000 in the previous year, a decrease of $28,500,000, or 17 per cent. Most of this reduction naturally was in loss from freight revenue. In 1908 this revenue from freight amounted to $98,000,000, which is 21 per cent. less than the freight revenue in 1907.

Expenses as a whole were $97,400,000 as against $119,600,000 in 1907. Of the $22,000,000 saved in operating expenses, $10,300,000 was saved in expenses of transportation, which expenses amounted to $51,500,000 last year, and $11,700,000 was saved in the cost of maintenance, maintenance of way and structures costing $15,200,000 last year and maintenance of equipment, $25,100,000 as against $20,000,000 and $32,000,000. The cost of maintenance of way and structures per mile of first, second, third, etc., track (switch tracks and sidings being counted half), was $1,980 in 1908 and $2,620 in 1907.

In speaking of the loss in revenue in 1908 President McCrea says: "This necessitated a drastic reduction in expenses in all departments and compelled the discharge of many thousands of (your) employees and a material decrease in the hours of labor of many of those retained in the service."

The Pennsylvania made only such extraordinary expenditures for additions and betterments as were necessary to complete work under way. The aggregate expenditures for construction, equipment and real estate on the main line between New York and Pittsburgh, including $7,500,000 on account of the principal of car trusts, was $15,300,000, of which $5,600,000 was charged to capital account, $7,300,000 to income, $300,000 to profit and loss and $2,100,000 to extraordinary expenditure fund. This, of course, does not include the expenditures on the tunnels and terminal station at New York, for which accounts are carried separately. The work on the tunnel extension was carried on throughout the year, and it is expected that the station and tunnels will be completed in the summer of 1910. The steel structure of the station is almost finished and over half of the exterior granite is in place, while the crosstown tunnels between the station and the East river and those under the East river, which as soon as the Pennsylvania gets into New York will connect with the Long Island, are ready for the laying of track.

The financing of this great work of the Pennsylvania has been done partly by charging cost of construction directly to capital account of the Pennsylvania Railroad, partly by expenditure from income of both the Pennsylvania Railroad and the Pennsylvania Company, and also by the contribution of $10,000,000 by the Pennsylvania Company, which sum was charged to its profit and loss account. The total amount carried on the balance sheet of the Pennsylvania Railroad Company on account of the New York tunnel system is $46,500,000. Of this amount, $15,000,000 is represented by capital stock of the Pennsylvania Tunnel & Terminal Railroad Co., at par, and the balance represents advances made on account of cost of construction up to December 31, 1908. This is after the deduction of the sums charged against income and profit and loss accounts of the Pennsylvania Railroad and the Pennsylvania Company. Possibly it is well here to recall the fact that the Pennsylvania Railroad owns almost all of the stock of the Pennsylvania Company and operates directly the lines east of Pittsburgh. The Pennsylvania Company owns a majority of the stock of the lines west of Pittsburgh and operates directly what is known as the Northwest system of the Pennsylvania Lines West.

A striking illustration of the strength of the Pennsylvania Railroad's credit was shown in 1908 when the company had decided to issue $40,000,000 40-year 4 per cent. consolidated mortgage bonds. It was found that the market for securities in this country was in such bad shape that to successfully float the issue it was necessary to market half of it abroad. An extremely strong combination of bankers underwrote the issue, and partly on account of the strength of the banking interests doing the financing and partly on account of the credit of the Pennsylvania itself, the sale of bonds was a notable success and marked the beginning of better times in the railway securities market.

Through the sale of these securities and through the general policy of the management, the cash position of the Pennsylvania is very strong. On December 31, 1908, current assets amounted to $83,900,000, and of these current assets $56,000,000 was in cash. This is a gain in cash over the previous year of $18,600,000. At the same time current liabilities amounted to $28,700,000, of which $14,200,000 was payrolls and vouchers, a decrease of $6,000,000 from 1907. In 1910 there are $60,000,000 short term notes maturing in March and $20,000,000 general mortgage bonds maturing in July, so that although the cash on hand would appear amply adequate for the needs of the company during the present year, the stockholders have authorized $80,000,000 bonds, which will be issued by the directors when necessary.

Interest from the investments of the Pennsylvania Railroad amounted to $11,300,000 as against $10,400,000 in 1907. The cost of securities held by the company was $232,000,000, so that the revenues received from them in 1908 was about 4.86 per cent. of their cost. The revenue in 1907 was $10,440,000, the increase in 1908 coming from dividends on additional New York, Philadelphia & Norfolk stock acquired during the year and interest on the securities from the Pennsylvania Company which were contributed toward the cost of construction of the New York tunnel extension.

Announcement has just been made that the Pennsylvania has repurchased between $15,000,000 and $16,000,000 stock of the Norfolk & Western, which it sold in September, 1906. At that time public sentiment was very much opposed to any apparent monopoly, and it was in deference to the expressed public opinion, that the Pennsylvania was attempting to control the shipments of bituminous coal to Tidewater, that it and its subsidiaries sold large blocks of stock in the Norfolk & Western. In December, 1908, the Pennsylvania Railroad itself owned $6,246,000 common and $3,246,000 adjustment preferred of the Norfolk & Western. It is understood that the present purchase of stock brings the holdings of the Pennsylvania and its subsidiaries up to about 37 per cent. of the outstanding stock of the Norfolk & Western. This announcement of the acquisition of a possible control coming so soon after the opening of the Virginian Railway, H. H. Rogers' new soft coal road, is of special interest not only to the stockholders of the Norfolk & Western but to Pennsylvania stockholders as well, since, as has already been pointed out, the Pennsylvania is a very large carrier of bituminous coal, and by more closely consolidating the Norfolk & Western business with its own it should be in a better position to meet the possibly severe competition which the Virginian Railway may undertake. It is also worth remembering that the Chesapeake & Ohio has been acquired by strong financial interest not connected with the Pennsylvania.

The average train load on the four grand divisions of the Pennsylvania was 602 tons in 1908, an increase of 28 tons over 1907. This is exceptional in a year of smaller offering of freight, and very few roads have shown even as large train loads in 1908 as in the previous year. It is of course in freight density, that is, the number of tons carried one mile per mile of road, that the Pennsylvania makes it most astonishing showing when compared with almost any other road in this country. Even last year the freight density was 4,270,000 tons and in 1907 it was 5,502,000 tons. This compares with a freight density in 1908 of 2,024,000 tons on the New York Central Lines and of 2,370,000 tons on the New York Central & Hudson River. The earnings on the Pennsylvania per ton

per mile last year were 0.569 cents and on the New York Central Lines, 0.598. In 1907 the earnings on the Pennsylvania per ton per mile were 0.577 cents. Even on such a road as the Bessemer & Lake Erie, where huge train loads of coal and ore are dragged along over an almost level country, the freight density was 5,538,000 tons in 1907, while on such a road as the Northern Pacific the freight density was but 77,000 tons in 1907.

The total operating revenue from July 1 to February 28 of the present year amounted to but $91,000,000 as against $106,000,000, but the earnings for February were $10,000,000 as against $9,800,000 in 1908, notwithstanding the fact that February had one day less tnis year than in the previous year. Moreover, from July 1 to February 28 the expenses for transportation amounted to $32,400,000 as against $40,100,000 in 1908. This showing should indicate that the Pennsylvania will earn considerably more net in the present year than last year, even if business does not improve any more rapidly than has been the case in the last six or seven months.

The following table shows the results of operation for the years 1908 and 1907:

	1908.	1907.
Average miles operated	3,862	3,858
Freight revenue	$97,989,330	$123,826,165
Passenger revenue	30,312,883	32,623,889
Total operating revenue	136,296,871	164,812,826
Maint. way and structures.	15,177,314	20,009,756
Maint. of equipment	25,113,455	31,977,703
Traffic	1,811,574	2,034,705
Transportation	51,463,479	61,835,024
Total operating expenses	97,412,016	119,607,348
Taxes	3,988,977	3,979,164
*Net earnings	32,189,193	36,349,248
Gross income	46,577,895	50,143,354
Net income	28,207,661	33,575,056
Additional and betterments...	†4,538,981	‡3,260,651
Dividends	18,875,681	21,908,436

*After the deduction of rentals paid roads operated on basis of net earnings.
†Includes $1,000,000 applied toward construction of New York tunnel extension.
‡Does not include $2,500,000 transferred to extraordinary expenditure fund.

GENERAL ELECTRIC COMPANY.

The seventeenth annual report of the General Electric Co. shows receipts of $47,168,469 in 1908 as compared with $72,484,988 in 1907. The profits for the fiscal year ended January 31, 1909, (the 1908 year above referred to) amounted to $4,802,253. This is after charging off for depreciation of plants, $1,524,295. This compares with profits of $6,586,653 for the year ended January 31, 1908. The business depression prevented any large new installations by companies which buy supplies from the General Electric, and the business received by the General Electric was largely from renewals to existing plants. The orders received by the company during the year were 70 per cent. only of those received for each of the two previous years, and the shipments to customers were only 63 per cent. of the shipments for 1907; so that in January, 1909, the capacity of the General Electric factories was far in excess of the then existing demands.

The unfilled orders as of January 31, 1909, were about $13,000,000 as compared with $14,500,000 at the close of the previous year. While the total number of separate orders and contracts received increased by 11,520, bringing the total up to 248,384 for the 1908 year, the average value per order was 30 per cent. less. The terms of payment, however, for orders compare favorably with recent years: 16.6 per cent. of orders called for payment on shipment and 68 per cent. for payment after 30 days in 1908, and in 1907, 17.8 per cent. called for payment on shipment and 68.5 per cent. for payment after 30 days.

Among the important contracts received during the year may be mentioned the following: Complete electrical equipment for two power stations and electric transmission plant furnishing power and light for the construction of dams at Gatun and Miraflores on the isthmus of Panama, the order also including 12 electric locomotives and numerous motors and electrical equipment; additional car equipment for the Hudson Tunnels Co., New York; rotary convertible apparatus to be used in supplying current for Southern Pacific 1,200 volt d.c. car equipments at Oakland, Cal., and five 2,500 k.w. generators, with switchboard and complete transformer equipment stepping up to transmission potential of 66,000 volts.

The anuual report of the General Electric Co. is a model for completeness and frankness. The policy of the company has been conservative, and the financial operations undertaken by the management have been shown and quite fully explained in the reports from year to year. The company has a capital stock of $65,178,800, and has outstanding $14,963,000 debentures. In 1908, after charging off liberal sums for depreciation, for the purchase of patents and for losses and after paying fixed charges, the company paid dividends of $5,214,026, which, with the most commendable frankness, it states left a deficit for the year of $411,773, which was charged to surplus account. As the surplus account amounted to $16,513,836 on January 31, 1908, the deficit of last year reduced it only to a very slight extent, leaving a total surplus January 31, 1909, of $16,102,063.

In 1898 patents and franchises were carried at $8,000,000, and since then, by charging off to profit and loss, depreciation and sums spent for new patents and for patent litigation, the company has reduced its book value of patents, franchises and good will to $1.00. Patent expenses have been heavy in the past few years, but the company wisely declines to include them among its assets. For instance, in 1908 there was spent for sundry patents, licenses under patents and in patent litigation, $929,109, all of which was at once charged off.

On account of easy money, probably, the company found much less difficulty last year in collecting accounts from its customers than in the previous year, and from this cause, and from the fact that its gross business was so much smaller last year, it accumulated a large stock of cash, amounting to $22,233,671 on January 31, 1909, compared with $12,250,721 on the same date in 1908. Of course the working capital of such a concern as the General Electric is necessarily very large, but $22,000,000 is obviously ample for all requirements. The company does not invest its cash as does the American Sugar Refining Co., but keeps it on deposit.

The company has no floating debt, and accounts payable of but $2,836,835. Its factory plants are all free from mortgage or other lien, and the book value of them in 1908 was $13,900,000, a valuation of but $1.98 per square foot of floor space, including land, buildings, power houses, machinery, tools and other equipment; the floor space being 7,000,000 sq. ft. in 1908.

The company carries as a separate item on its balance sheet $3,174,581 as copper mining investment. The General Electric is one of the three or four largest buyers of copper in the United States, and has benefited to a certain extent both during 1908 and 1907 from the cheap price of copper. Should, however, the price of copper materially increase it will profit by its independent supply.

The following table shows the company's sales and orders for the last six years:

Years ending January 31:	Sales billed.	Orders received.
1904	$41,699,617	$39,060,038
1905	39,231,328	35,094,807
1906	43,146,902	50,044,272
1907	60,071,883	60,483,659
1908	70,977,168	59,301,040
1909	44,540,676	42,186,917

"Orders received" include only apparatus and materials manufactured by the General Electric Co. and do not include labor of installation, freight and transportation, or materials of outside manufacture. All these items are included in "Sales billed."

NEW PUBLICATIONS.

The Fare Question.—Published by the American Street & Interurban Railway Association, 29 West 39th street, New York, 1909. 150 pages; 6 in. x 9 in.; paper.

It is well-known to readers of the *Railroad Age Gazette* that

a great many street railways have been increasing their fares in the last three years because they had started out on a basis quite unremunerative, or else had so increased their length of haul and so extended their transfer privilege that the passenger was getting more for his nickel than the company could afford to give him. The pamphlet at hand tells in a clear and very interesting way the difficulties that some of the roads have encountered, especially in Massachusetts, and discusses the means of increasing the fares. The question is a live one, and we are inclined to think that the matter contained in this pamphlet would interest the traffic departments of a good many steam railways. No price is quoted for the pamphlet; we presume it can be obtained in limited quantities upon application.

Moody's Analyses of Railroad Investments. First Annual Number, 1909. By John Moody. Published by Analyses Publishing Co., 35 Nassau street, New York. 551 pages; 8 in. x 11 in.; cloth. Price, $12 net; expressage, 50 cents.

Mr. Moody, in the extremely important volume at hand, investigates railway values. He points out that the book is in no sense a manual, nor is it intended to supplant manuals, but it explains and applies in clear and simple form the proper methods of the analysis, from the standpoint of the banker and investor, of the various kinds of railway securities issued by railway corporations, from the highest grade bonds to the most speculative and cheapest stocks. The study includes most of the important railways of the United States, and complete analyses worked out on thoroughly sound and scientific lines are presented in uniform style for all.

The book contains three sections. The first one is an extended discussion of primary principles and their practical application in the analysis of railway reports, with copious examples and illustrations designed to clarify, for the ordinary investor, the complexity of the average railway report and to enable him to make quick and intelligent comparison. The second portion of the book presents, in simple form, but in complete detail, the Interstate Commerce Commission's system of accounting, which has been adopted as the reporting method for all American railways. The third section is devoted to analyses, based on a showing of averages, as reported by the railways for a period of ten years. In this section the physical factors, such as miles of line, equipment, traffic, density trainloads, passenger and freight rate, etc., are shown through the entire decade, indicating the trend of changes for the period, and also the position of the property in any year during the decade, as well as the average result for the ten years. This average is compared with the averages of other railways similarly situated, and comments are made on the showing.

The income factors are covered in a second statement, and these are all reduced to the average mileage basis of the system for each year and show, in addition to gross revenue and operating expenses, total net income, fixed charges, surplus, disposition of surplus and the margin of safety over fixed charges. A third statement covers capitalization, reduced in the same way to the average operating mileage basis of the system. Where rentals exist, they have been capitalized at 5 per cent., and reduced to a mileage basis with other capital items, and approximate net capital per mile is thus shown for each year, and a percentage of net income is worked out on this net capital, thus showing the trend of earnings in relation to capital invested. In the same table a dividend record is presented, which shows the margin of safety over the dividend requirements for each year and for the decade.

Each of the bond issues of each railway is given a rating based on its margin of safety. This margin of safety is calculated from the average earnings which protect it, and the work of calculation has been done in a careful and scholarly way.

This general description, much of which is taken from the author's own prospectus, is rather inadequate. It may be said in brief that the book tries to give for each railway and for each bond the statement which would be asked from the statistician of a good private banking house by the partners, when the railway or the bond was under consideration. With the exception of certain kinds of transitory and confidential information which the statistician would probably possess, the record in this book is as complete as need be, and the book is far better adapted for the use of the intelligent private investor than is any railway manual that has come to our attention. It is a mistake to suppose that the author's elaborate studies can be used without some thought, however. It took hard work to prepare them, and it will require reasonably hard work to make really efficient use of them. Like all other elaborate workings out of statistical systems on arbitrary bases, it is possible for this book to mislead the investor who tries to apply its conclusions without using independent thought. For the investor who does use independent thought, however, and who is accustomed to make more or less full and intelligent analyses of his own, this book will be of enormous assistance, and if the author carries out his intention of revising it annually, it is well worthy of a permanent place in every financial library.

Railroad Construction.—By Walter Loring Webb. New York: John Wiley & Sons. Fourth edition; 777 pages; 4 in. by 6 in.; 217 illustrations; flexible leather. Price, $5.00.

This book is a compound of a treatise on railway construction and a pocketbook on the same subject. Its form is that of the usual engineer's handbook, so that it can readily be carried in the pocket; it is printed on thin paper and it is provided with a copious index. At the same time, the subject matter partakes more of the character of a treatise on the subject, and a very interesting one at that. It is divided into chapters, and these treat of surveys, alinement, earthwork, trestles, tunnels, culverts, ballast, tires, rails and fastenings, switches, buildings, yards, signals, rolling stock, train resistance and cost. The second part deals with the economics of railway location and of operation as dependent thereon. Under each of these headings the subject in hand is briefly but comprehensively treated. For example, the chapter on earthwork opens with outlines of the usual cross-sections of cuts and fills and the methods to be employed in the calculation of quantities. In this there is no attempt to teach the mathematics of the subject, but the advisable methods to be pursued are outlined and it is taken for granted that the reader will have had the training to apply that method without detailed instruction. Of course the slopes must be left to the judgment of the engineer, but there are innumerable hints as to the method to be pursued in the work, such as the case of a compound section of rock and earth, where it is suggested that it will be well to remove the center portion of the section first until enough of the rock surface has been exposed so that the cut in it can be given the proper width and side slopes. This is cited merely to show the minuteness with which the text enters into some of the details. The same comprehensiveness in outline obtains throughout the book, and though it is, of course, impossible to produce a treatise on any one of the subjects that are handled, enough is presented in each case to indicate the lines along which a more thorough investigation should be conducted.

In the part of the book devoted to railway economics, the author starts with the promotion of railway projects, and discusses the various points to be considered, such as terminal facilities and traffic, and then takes up the matter of operating expenses as involved in maintenance of way and equipment and the cost of conducting transportation. Then come the effects of distance on traffic, expenses and receipts; the desirability of eliminating grades and curves and the amount of expense that will be justified in the relocation of old lines.

The book thus furnishes an outline guide for the general consideration of railway work, though it is hardly of a character that an engineer would care to carry as a pocket book, except for a few isolated formulas that could be easily copied

and for the mathematical tables of trigonometrical values and of quantities with which it ends.

The Engineering Index Annual, 1908.—Published by *The Engineering Magazine*, 140 Nassau street, New York. 438 pages; 6¼ in. x 9¼ in.; cloth. Price, $2.

This is the seventh consecutive volume of engineering indexes which *The Engineering Magazine* has published, and the entire series covers the technical press quite fully from 1884 to 1908. We have always had considerable admiration for the careful and scholarly way in which this work has been done, and we believe that this volume is an important addition to libraries which desire to be able to locate contributions in the current engineering press. Much matter of the highest value appears in this way from week to week, and much of it would be irretrievably lost for anything like ready reference, even a short time after its publication, were it not for this careful indexing which *The Engineering Magazine* does. As most of our readers know, the plan of this index is a generous one, and the brief abstract following each title supplies what is really an index on the card catalogue order.

The Earning Power of Railroads. Compiled and edited by Floyd W. Mundy, of James H. Oliphant & Co. Published by James H. Oliphant & Co., 20 Broad street, New York. 428 pages; 4¾ in. x 7¼ in.; cloth.

This extremely handy reference book has been appearing annually now for a number of years and is well-known to most railway investors. The plan of the book is to give the salient statistical records which affect the earning power and investment value of railways, comparisons being made for a series of years and on a system of unit basis which makes it tolerably easy to set one road off alongside another. Quite full notes are also given about the affairs of each road, and these notes greatly extend the information contained in the tables.

The Merged Roads of Mexico. A series of papers on the Mexican railway system, written by Charles F. Speare and reprinted from the *Evening Mail*, New York, in pamphlet form. Paper; 26 pages; 6 in. x 9 in. Price, 25 cents.

Mr. Speare's pamphlet gives an excellent idea of the Mexican railway situation; a situation which is none too clearly understood in this country. It is well worth reading.

Letters to the Editor.

REGULAR BILLING ACCOMPANYING OR IN ADVANCE OF TRAFFIC.

Birmingham, Ala., April 13, 1909.

To the Editor of the Railroad Age Gazette:

The article by W. H. Newman under above caption, published in your issue of January 29, again draws attention to a question of great importance, not only to the transportation department, but to the traffic department also, and even to the accounting department. Formerly it was customary to card-bill cars under any and all conditions, and mail revenue waybills whenever convenient to do so. This led to abuses and conditions, resulting in serious delays to traffic, congestion in terminal yards, and loss of *per diem*.

To correct these conditions it was the consensus of opinion that regular billing must "accompany or precede" traffic, and a reform having this for its object has swept over the country. As in all reforms, the pendulum has swung too far, for in our anxiety to have regular billing *accompany* traffic, we have overlooked the greater importance of having regular billing *precede* traffic.

On many roads there is rigidly enforced the arbitrary rule that regular billing must accompany traffic. When regular billing must accompany traffic, naturally it may not precede it This rule is as serious a blow to prompt movement of cars at junction points, to prompt handling of less than carload freight at unloading points, to efficient and intelligent service to consignees in giving advice of expected shipments, especially perishable, as was the old discarded system of allowing revenue waybills to follow traffic. It should not be permitted that revenue billing may either accompany or precede traffic, but it should be required that revenue billing must precede traffic, if possible, but if not should accompany it.

I am firmly of the opinion that the following rules should govern the forwarding agent in determining whether waybills should precede or accompany the car:

1. No cars must be forwarded unless necessary data are in hand from which to furnish revenue billing.

2. If waybill can be mailed on passenger train which will reach destination (or junction on which car is billed) before arrival of car by freight train, then waybill must be mailed, and car card-billed, and card bill must bear notation of the number and date of the train on which revenue waybill has been or will be mailed.

3. If waybill can not be mailed on passenger train so as to reach destination or junction before arrival of car by freight train, then revenue waybill must accompany the car; but every effort must be made to have revenue waybills precede the cars.

Rule one would cover the receipt of cars from connecting lines and the checking of rates, etc.

If revenue waybills precede the cars, the cars on arrival will pass through junction yards into trains of connecting lines and out on their journey with the same precision and promptness as if no junction had been reached.

Take a case where a train arrives, the waybills covering having preceded by mail: Waybills have been revised, routed, expensed, and abstracted to connecting lines; and the yard has a "mark up" so that train is broken up into "cuts" for various connections, house tracks, etc., and is handled without further instructions or delay. Merchandise cars are placed at depot and unloading clerk has waybills in hand by the time cars are placed. The cashier's office has already made the freight bills for the same car, and freight can be delivered to consignees or transfer companies as fast as it is trucked from cars to warehouse.

Take another train with waybills accompanying the cars: The train arrives but the yard clerk is not sufficiently familiar with rates, routes and traffic arrangements to route more than fifty per cent. of the cars in train. The other fifty per cent. go to the yard cemetery, commonly known as the "hold" track, where they must stay at least until the revising clerk can receive waybills from the yard, check rates and routes and then instruct the yard as to delivery. The chances are that the "hold" track will claim such cars for twenty-four hours, more or less.

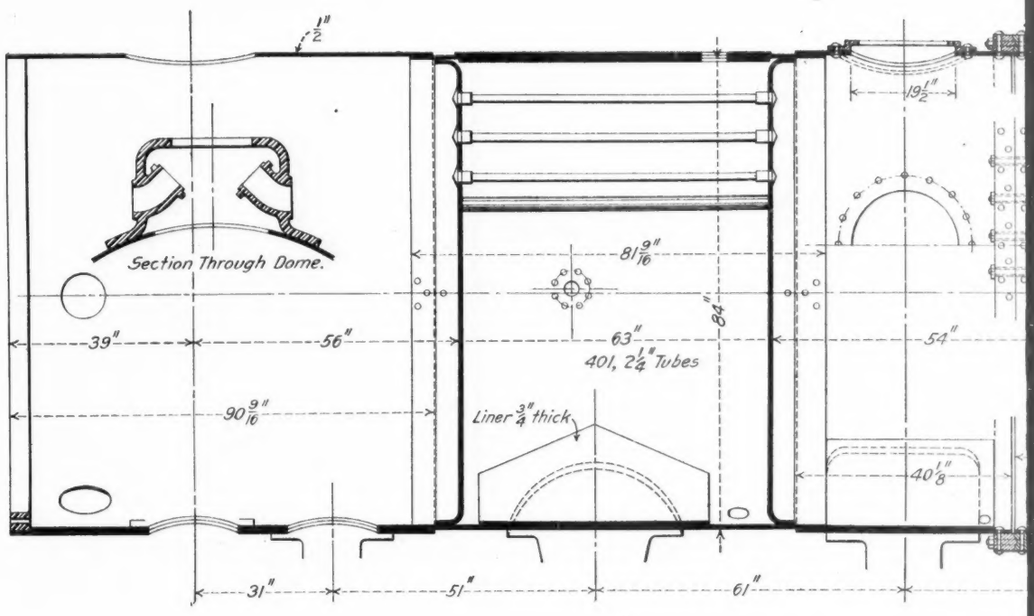
Even such cars as are delivered on arrival to connecting lines meet with delay and extra handling, as the freight office has not had time to furnish waybills to cover, and the receiving line does not know whether to accept such cars on faith, or reject them pending receipt of revenue waybills.

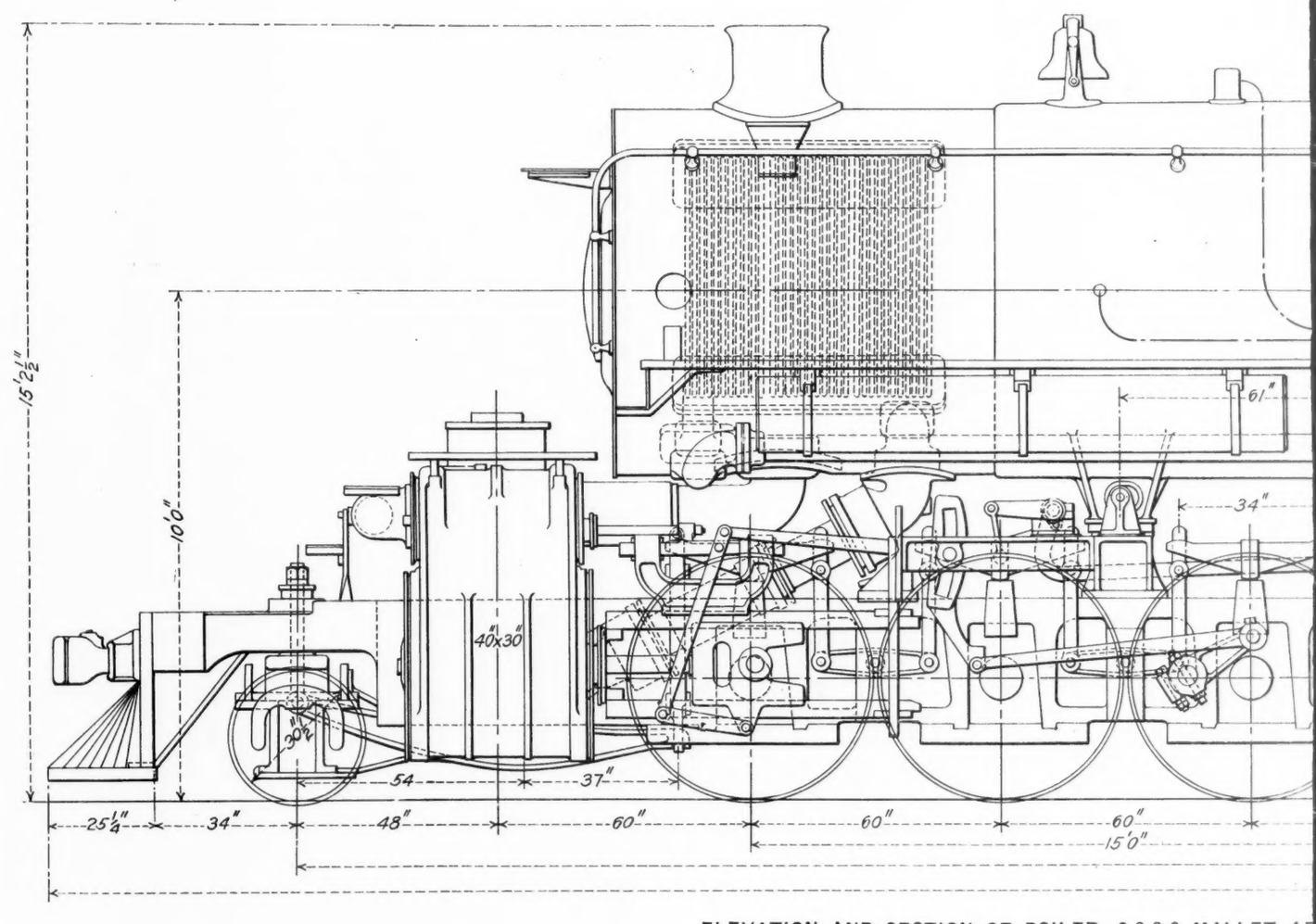
Take the time merchandise sent to the house for unloading; the time required for checking rates and making freight bills, added to the time for actual unloading, will usually prevent delivery before the following day and must, at best, delay delivery several hours.

Another strong argument for the waybill to precede the car is that if the car is set out or delayed, the receiving agent can still take the waybill into account and can trace the car through his superintendent of car service, thereby having a double check against an indefinite delay.

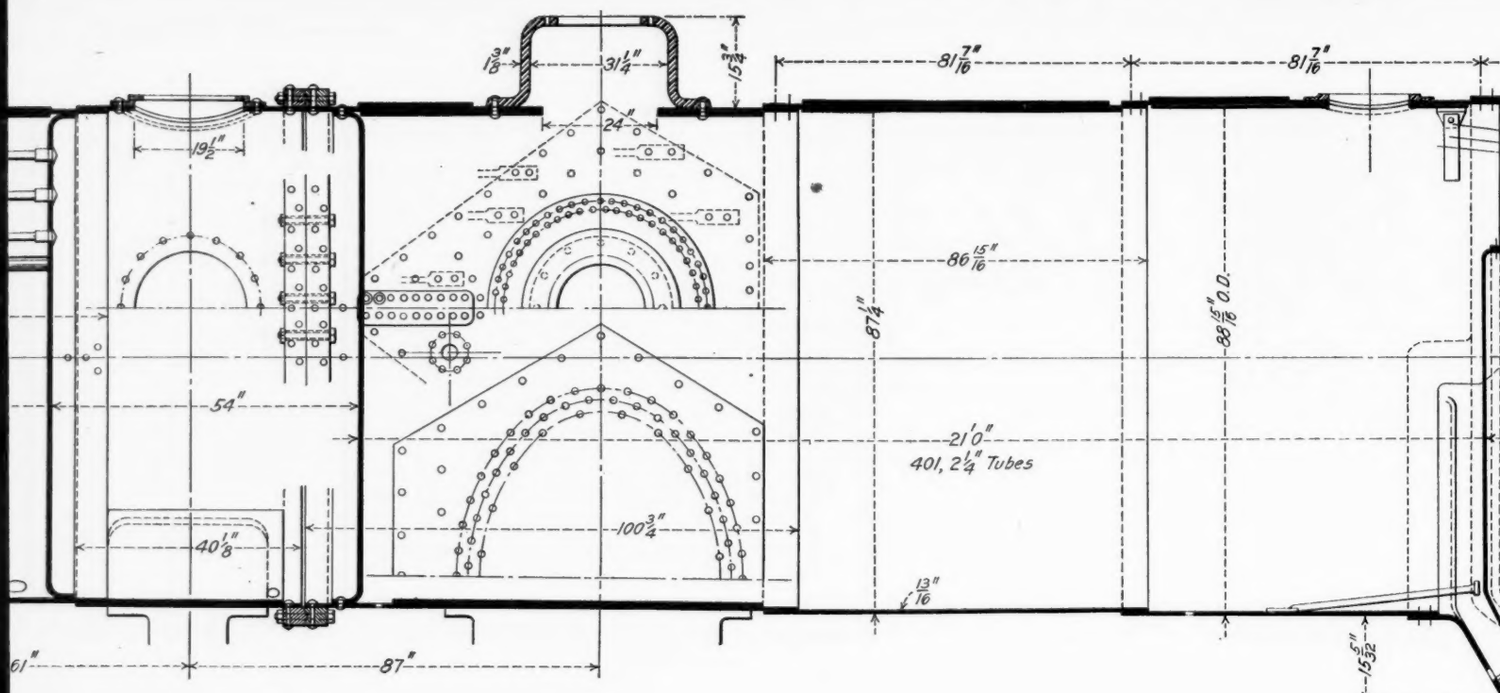
The obvious conclusion is that waybills should precede cars whenever possible, but if impossible to precede, should accompany the traffic.

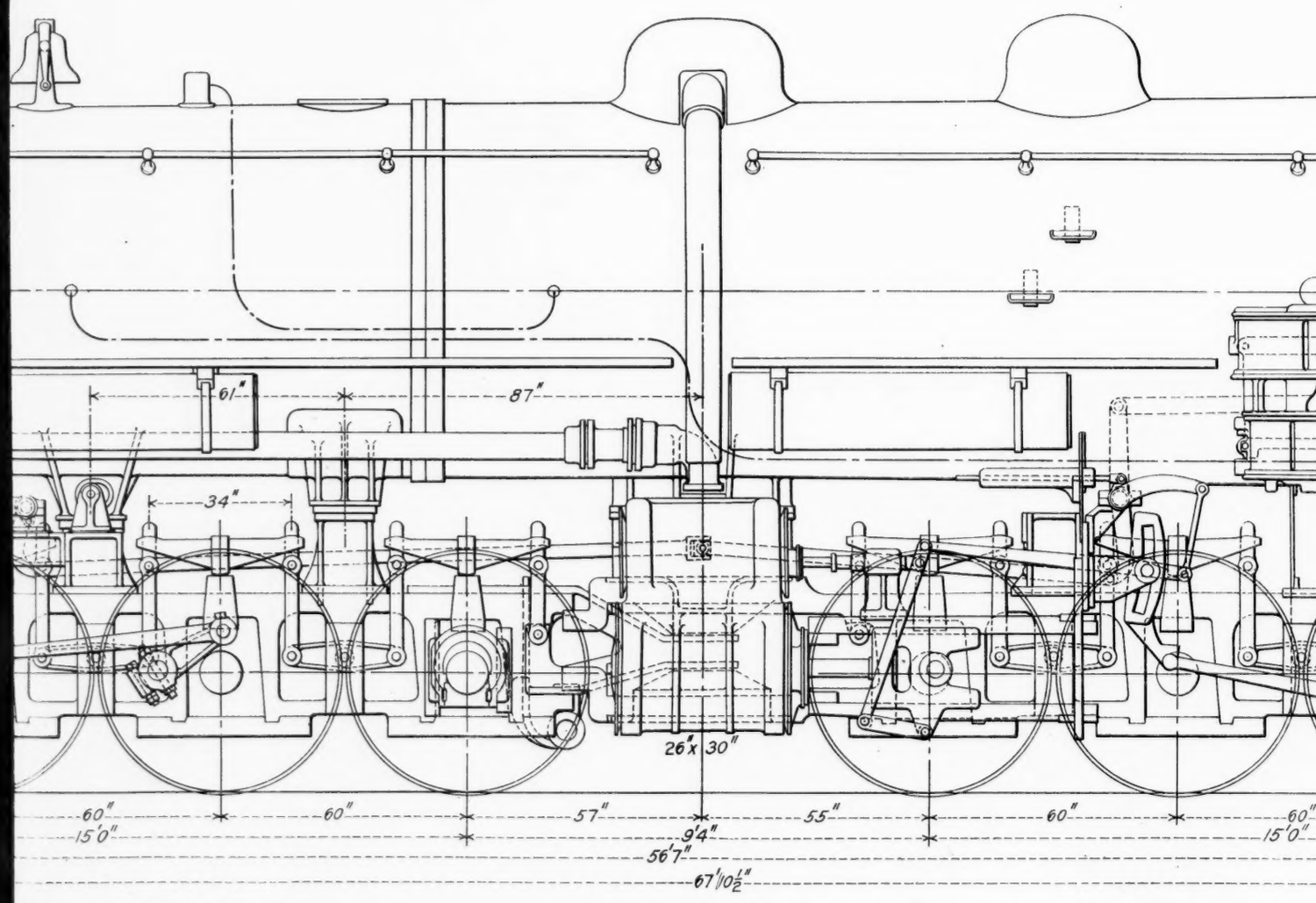
V. E. WHITAKER,
Agent Seaboard Air Line, Birmingham, Ala.



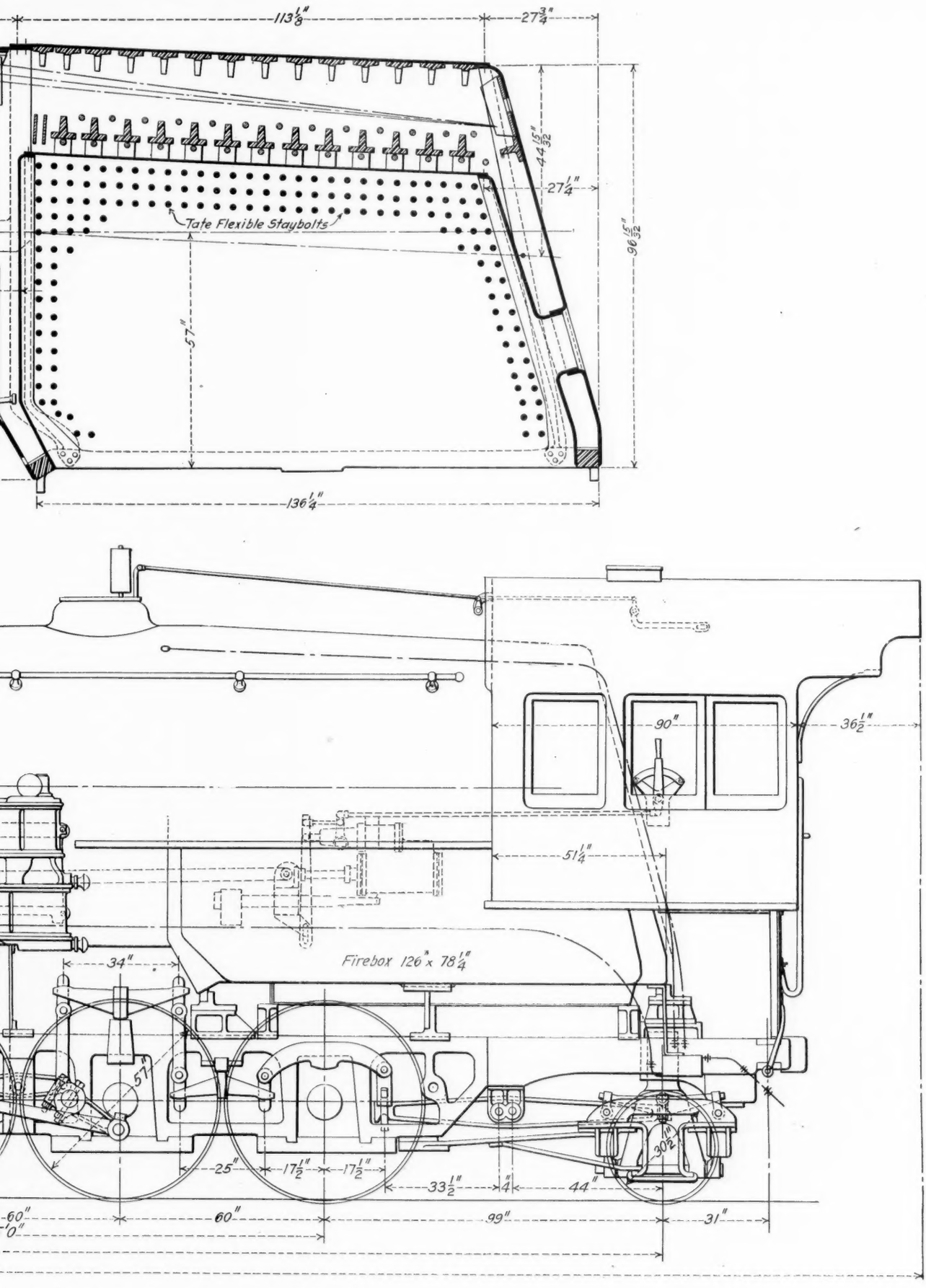


ELEVATION AND SECTION OF BOILER, 2-8-8-2 MALLET AR

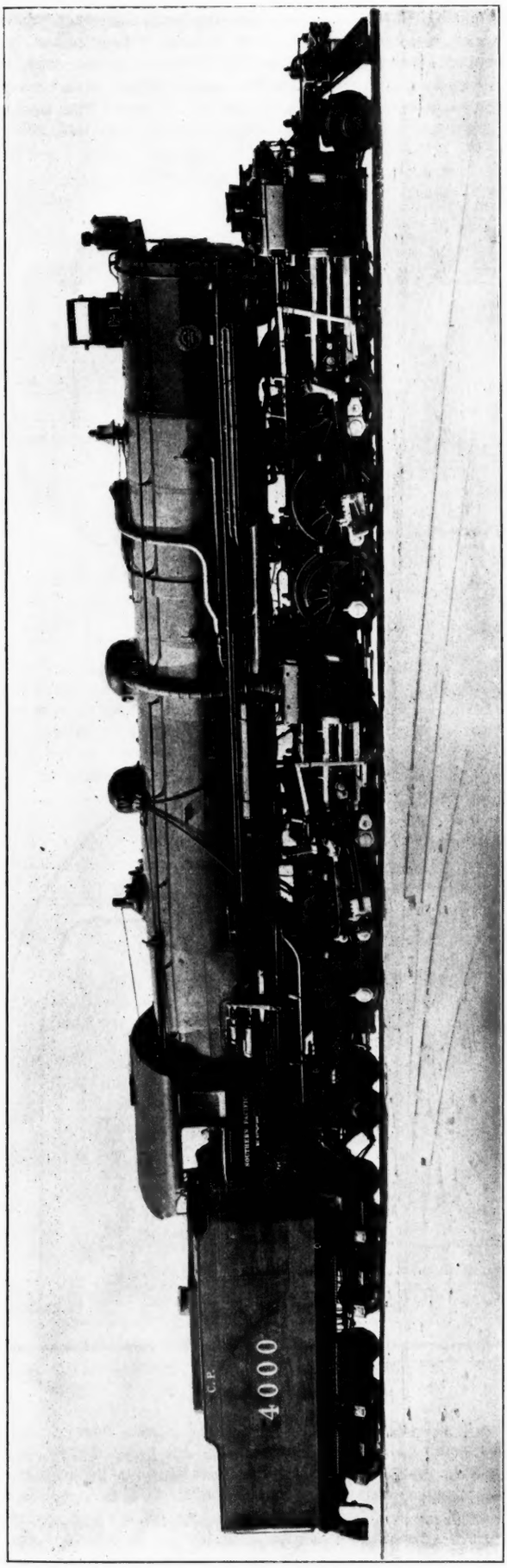




OILER, 2-8-8-2 MALLET ARTICULATED COMPOUNDS, BUILT BY THE BALDWIN LOCOMOTIVE WORKS FOR THE SOUTHERN PA



PACIFIC RAILWAY. WEIGHT 430,000 LBS.



Mallet Articulated Compound Locomotive for the Southern Pacific. Built by the Baldwin Locomotive Works.

MALLET ARTICULATED COMPOUND LOCOMOTIVE FOR THE SOUTHERN PACIFIC.

[WITH AN INSET.]

The record for the maximum-weight locomotive has again been broken, this time by the Baldwin Locomotive Works, in two Mallet articulated compound locomotives built for the Southern Pacific Company. The engines are intended for operation on a grade of 116 ft. to the mile, and it is the expectation that they will haul 1,212 tons back of the tender. The general design follows that of the locomotives built by the same company for the Great Northern, which were illustrated in the *Railroad Gazette* Aug. 17 and Oct. 12, 1906, in that they have a two-wheel leading truck at the front and back. The weight, however, is considerably greater than that of the Great Northern engines. The latter weighed 355,000 lbs., of which 316,000 lbs. were on the driving wheels. There were three pairs of these in each truck. In the Southern Pacific locomotives there are four pair of driving wheels in each truck, and the total weight is 430,000 lbs., of which 390,000 lbs. are on the driving wheels. This total weight is, therefore, about 20,000 lbs. more than that of the Erie Mallet, which weighs 410,000 lbs.; but as the whole weight of this engine is on the driving wheels, the Southern Pacific falls about 20,000 lbs. short, with a corresponding reduction in tractive effort.

The engines are, however, modifications and are a development of the Great Northern machines. The locomotives are very long, having an engine wheel base of 56 ft. 7 in., while that of the engine and tender is 83 ft. 6 in., and the over-all dimensions are 39 ft. 10 in. A part of this length is due to the use of the trucks at the ends of main frames, and though ordinarily their use makes it possible to put in a larger boiler than would otherwise be possible, in this instance it has been necessary to make the length of the boiler very great, it being 50 ft. 4in. from the lower edge of the back head of the firebox to the front of the smokebox ring, which is far in excess of anything that has ever been built before for locomotive work. As it would be out of the question to utilize this whole distance with the ordinary firebox, tubes and smokebox, a radical innovation in design has been introduced.

The firebox is of the ordinary type with sloping back sheets and a shallow combustion chamber incline, makins its total length 126 in. The tubes are 21 ft. long over the tube sheets. This takes up 31 ft. of the length. It is at this point that the innovation appears.

Instead of making the whole length in one rigid piece it is built in two sections. The rear section terminates just in front of the front tube sheet where a heavy ring is riveted to the outside and mates with another riveted to the front section, the two joining in a V recess and projection and being held together by 42, 1¼-in. bolts.

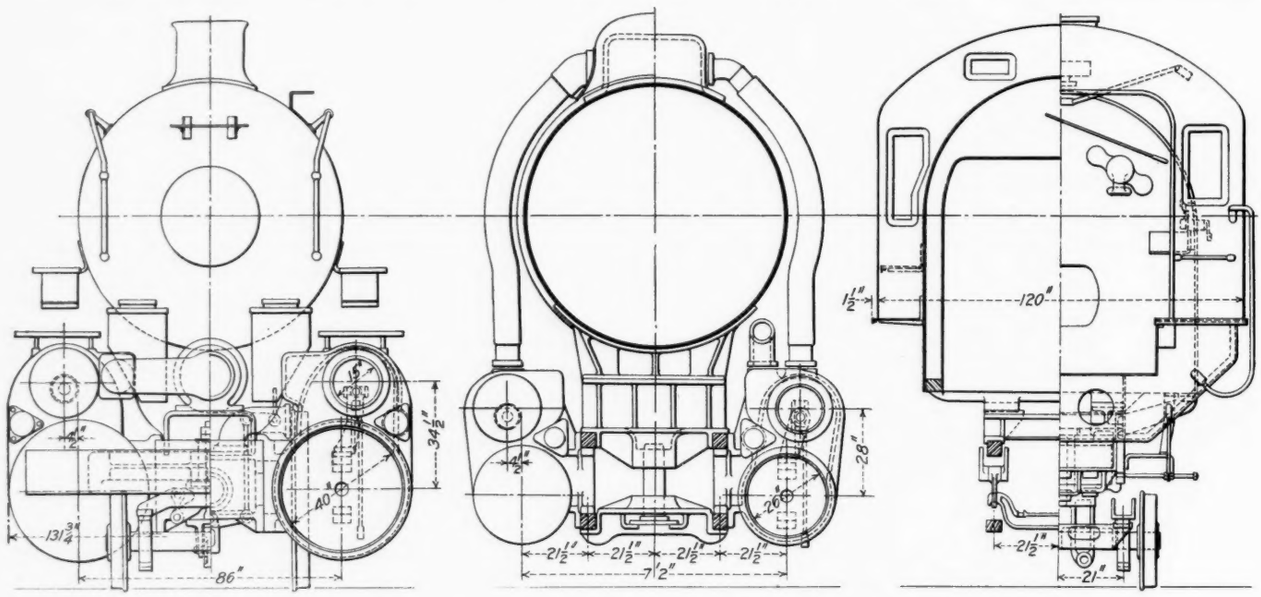
The front section consists of a plain, cylindrical shell with a feedwater heater built into its central portion. When it is bolted in position there is a combustion chamber 54 in. long immediately in front of the fire tubes. The feedwater heater then comes, occupying 63 in., beyond which is the smokebox with a length of 95 in. The feedwater heater consists of a space enclosed by two circular tube sheets riveted in the shell and having the same number and size of tubes in it that are used in the main shell of the boiler; that is, to say 401 2¼-in. tubes, which are spaced and set to mate those back of it.

Two non-lifting Hancock inspirators are used, and these deliver into feed-water heater at about the center line of the boiler, as indicated on the engraving. The feed after circulating through the heater passes out at the top and, coming down and back around the outside of the boiler, enters it through a check on the center line of the shell, 21 in. back of the tube sheet.

The feedwater heater will be kept full of water at all times, and it will be the overflow from this that reaches the boiler. Under ordinary working conditions the temperature will be

below that corresponding to the boiler pressure, but if it should so happen by any chance that steam sould be generated and a pressure in excess of that existing in the boiler start to be developed, it would at once be equalized by escaping back into the main boiler.

In the smokebox there is a Baldwin superheater. It is of the same type as that illustrated in the *Railroad Gazette*, for



Cross Sections and Elevations; Mallet Articulated Compound for the Southern Pacific.

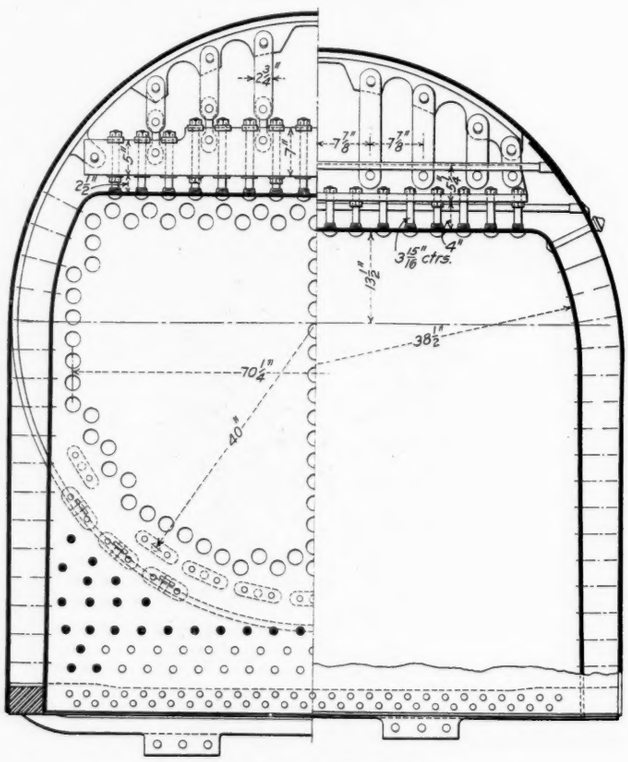
March 27, 1908, with the modification that, instead of taking steam at the top and discharging at the bottom, both inlet and outlet are at the bottom. There have also been a few minor modifications, such as a rearrangement of the bolts holding the headers in place, which while important as details, do not affect the general design or its efficiency.

The junction ring thus serves to make the handling of the boiler safer and more convenient than would otherwise be the case with the usual repair shop facilities.

The steam dome is set well out to the front and in line with the center of the high-pressure cylinders. It is of cast steel, and the steam pipes lead down from it on the outside of the boiler to the steam chests of the high-pressure cylinders.

Such a boiler design as this must necessarily be regarded as more or less experimental. The tubes are almost up to the maximum of length that are used, and though they are 2¼ in. in diameter, it is certain that they will have a marked cooling effect on the gases, though probably not as much as though they were smaller. These gases then pass through the feedwater heater, and, as the tubes here are 5 ft. 3 in. long, it appears likely that a large amount of heat will be abstracted. So the chances are that, when the gases finally enter the smokebox, their temperature will be very low, and it remains to see whether they will be capable of adding anything in the way of superheat to the steam. The boiler, therefore, presents an exceptional opportunity for studying effects, and the determination of gas temperature and its performance should go far towards settling the discussion that has been on for so many years as to the value of feedwater heaters on locomotives. That some heat will be added to the water there can be no doubt, and if the temperature is raised above the precipitating point of the scale, it seems probable that, with the comparatively slow circulating velocities that must prevail there, the heater space will serve as a settling tank for the accumulation of precipitates, and thus serve as a protection to the tubes of the main boiler.

The arrangement of steam pipes in these Southern Pacific locomotives is quite different from that of the Great Northern. In the latter, it will be remembered that the high pressure exhaust from the two cylinders was discharged into a Y whose leg was connected by a slip joint with a receiver pipe lying beneath the boiler and between the frames. A ball joint at the front end connected the receiver with the low-pressure steam chests. The low-pressure exhaust reached the smokebox through a pipe fitted with a slip joint and two ball joints.



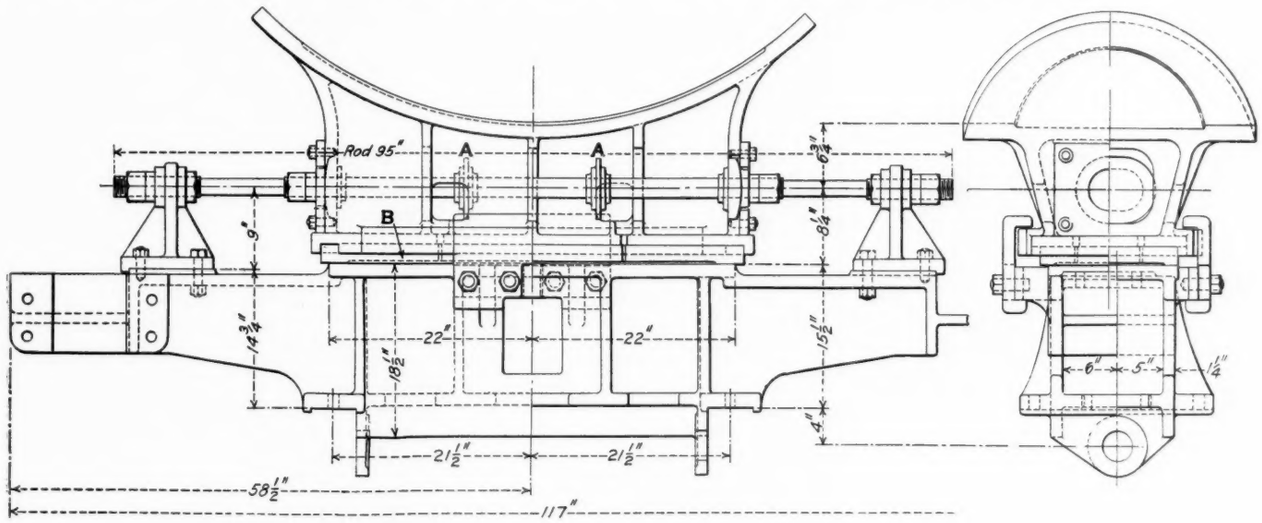
Sections of Firebox.

In the Southern Pacific locomotives, quite a different arrangement is used. As the high-pressure cylinder saddles are attached to the boiler, there is no movement between it and the rear frames.

The high-pressure exhaust pipes are, therefore, brought out from the steam chests and carried along the side of the shell

beneath the running boards to the smokebox, where they turn in and enter the superheater at the bottom.

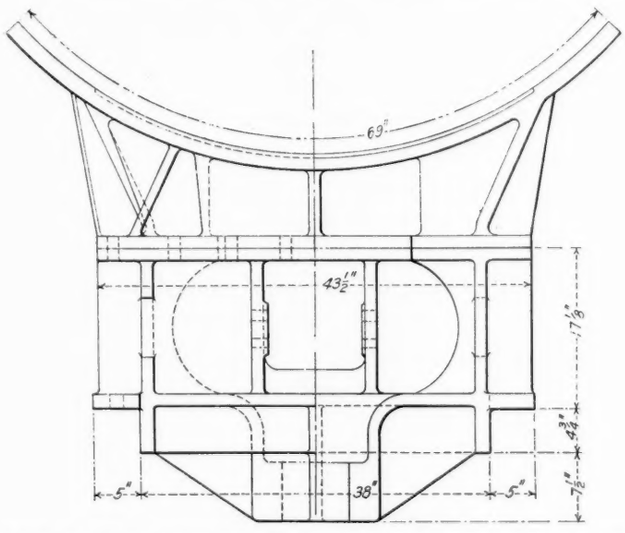
The steam, after passing through the superheater, or rather re-heater, as it really is, is let down on a sharp incline to the low-pressure steam chest. Flexibility is here obtained by means of the usual combination of two ball-and-socket joints and a slip joint. The distance between the rigid points of the packing is effected by means of a gland and stuffing box, but with that of the exhaust pipe, tightness is secured by means of snap rings and leakage grooves. At the smokebox end the ball or socket joint is fitted with a coiled spring which holds the pipe against its seat. For the regular ball joints, tightness and contact is obtained by means of bearing pieces held in place by a gland with the usual bolts.



Self-Centering Waist Bearer.

attachment, that is to say, between the centers of the ball joints, is about 5 ft. 3 in. As the wheel-base and flexibility of the engine has been designed to pass a curve of 16 degrees, the lateral movement of the front truck will be about 1 ft. This will involve considerable motion not only for these joints, but for those of the low-pressure exhaust; but it is considered that no trouble from excessive wear or leakage will be experienced.

The exhaust from the low-pressure cylinders is delivered into a double return bend of 9-in. inside diameter, and thence, after coming together, passes into a 11-in. exhaust pipe fitted first with a ball joint, then a slip joint and, at the smokebox beneath the exhaust nozzle, with a socket joint that has a sufficient rocking motion to compensate for the action of the springs and the swinging of the boiler.



Cast Steel Cylinder Saddle; Mallet Articulated Compound for the Southern Pacific.

In the case of the slip joint of the low-pressure steam pipe, the articulation of the locomotive is accomplished by connecting the two frames at their adjoining ends with a 7-in. pin put in from beneath. In the case of the Great Northern engines there were two radius bars, one entering an opening in the saddle and the other down below on an independent cross-tie bolted to the bottom rail of the frame.

In the Southern Pacific engines there is but one bar. This is bolted to the back end of the front frames and sets up against the bottom of the cylinder saddle. Then beneath it there is a cross-tie bolted to the lower rails of the front portion of the rear frames. A 7-in. pin passes through these three pieces and is held in place by a plate that is itself held by lips cast on the cross-tie. The pin thus serves to transmit the tractive effort of the front to the rear frames by way of the cross-tie and saddle.

The connection between the frames and the boiler is made, for the rear frames, through the cylinder saddle, buckle plates and expansion plates in the usual manner. For the front frames there are two waist bearers and the cylinder saddle. One of the waist bearers consists of a simple bracket bolted to the shell which has a bearing on the top of a cross-tie brace bolted to the frames. Then when the engine is traversing a curve, and the boiler maintains its alinement with the rear frame, the bracket simply slides to and fro upon the cross-tie. The construction of this is identically the same as that used on the Great Northern, which was illustrated in the issue of the *Railroad Gazette*, Oct. 12, 1906. The change in the steam pipes and the connections has, however, necessitated a change in the details of the low-pressure saddle and bearing bracket, which has been made like that shown in the illustration. The saddle is a steel casting bolted to the frames and forming a cross-tie for them, and over it there is a simple bracket or carrier bolted to the bottom of the smokebox. The area in contact at the saddle measures 43½ in. by 45 in. In the Great Northern engines the waist bearer was of this character. In the Southern Pacific machines a modification has been introduced in the second waist bearer that is towards the front end of the forward frame by which centering springs are used that tend to bring the frame back to its central position after it has been swung out of line on a curve. The cross-tie used as a support for the bearer bracket is a steel

casting 9 ft. 9 in. long over all, that is bolted to the frames, and extends out far enough on either side to carry some of the valve rigging. The bearer bracket is riveted to the bottom of the boiler shell and has a passage cored in the side walls to admit the centering rod. This rod, which is 1⅝ in. in diameter and 7 ft. 11 in. long, carries two washers near its center that serve as seats for the centering springs. The outer seats for the springs are formed by caps that cover the openings in the bracket and are bolted to the same by studs and nuts. The rod is fastened at its outer ends, to brackets that are bolted to the upper face of the overhang of the crosstie, so that any lateral movement of the boiler relatively to the shell will compress one or the other of these springs, whose tension will thereupon tend to return it to the central position.

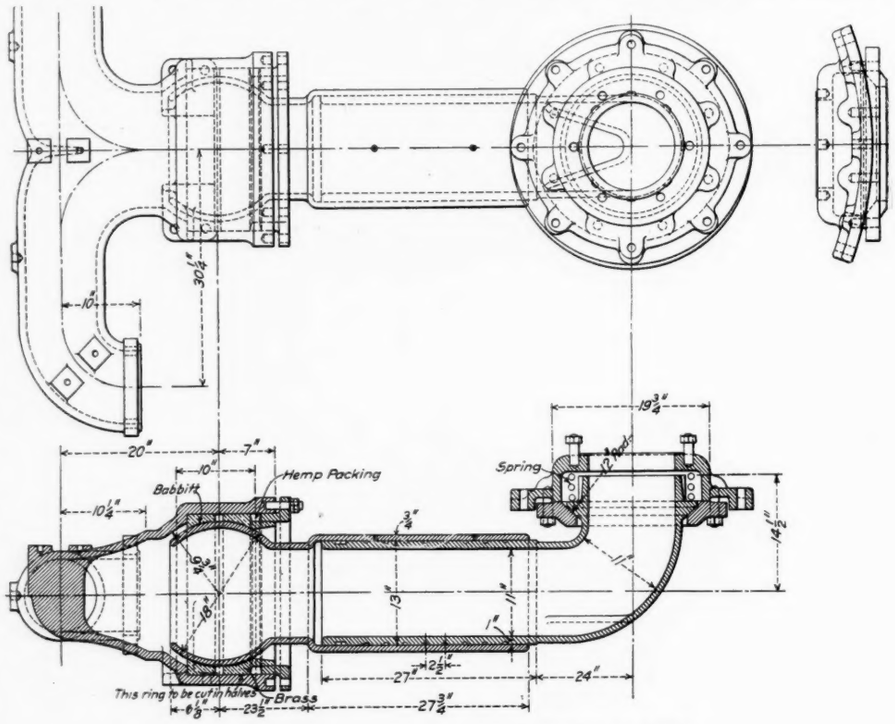
Both the bracket that is riveted to the boiler and the crosstie are of steel castings, and they are separated by a wearing shoe of cast iron, that is made with a lip, projecting into the bracket and so moves with it. The two surfaces in rubbing contact are, therefore, of cast iron and cast steel respectively; and the bottom of the cast iron shoe is grooved with oil passages so as to facilitate the lubrication.

The boiler is thus supported at seven points: at the front and back of the firebox by expansion plates; at the waist by two buckle plates; at the high-pressure saddle, and by the two waist bearers on the front extension. These waist bearers are set; one 7 ft. 3 in. ahead of the center line of the high-pressure cylinders and the other 5 ft. 1 in. ahead of this. There is, therefore, left about 10 ft. of overhang of the feed water heater section and the smokebox beyond the center of the front waist bearer.

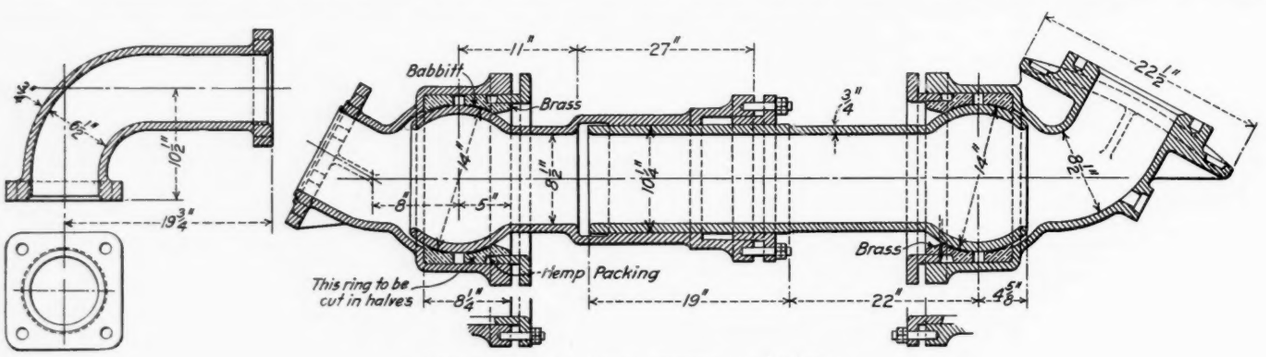
In the Great Northern locomotives, flat valves were used upon both the high and low-pressure cylinders. In these Southern Pacific locomotives, piston valves are used. The high-pressure cylinder is 26 in. inside diameter, with walls 1½ in. thick, and it has a valve chamber bored out to 16⅜ in. This is bushed down to 15 in. for the valve face with cast iron, as shown. Both cylinders are fitted with the Sheedy drifting valve, which is simply a by-pass that is opened by spring-actuated valves at the ends of the passage, whenever steam is shut off. These passages are 5 in. diameter for each cylinder. The valves are arranged for inside admission and are worked by the Walschaerts gear. As will be seen by a reference to the engraving, there is a difference in the method of fastening the cylinders to the frames. The rear frames are of the bar type for their whole length and the lugs on the cylinder casting are arranged to bear against the sides of both rails; the bottom of the top rail and the top of the bottom rail. In each place it is held by staggered 1½-in. bolts driven both horizontally and vertically.

The front frame differs from the rear, in that instead of being continuous and in one piece from end to end, the bar section stops at the cylinders and to it a front slab section is bolted. It is to this that the low-pressure cylinders are bolted. These cylinders are 40 in. in diameter and have 15-in. piston valves, which are also arranged for inside admission. The walls are 1⅝ in. thick, stiffened by two strengthening ribs between the flanges. The steam posts are very short and are 1½ in. wide through the valve bushings, and open into passages 1¾ in. wide cored in the cylinder casting.

The valves are worked by the Walschaerts gear and these are so designed for the front and rear engines that they balance each other, the eccentric cranks being so arranged that one follows while the other leads the main crank, so that the back radius rod is raised while the forward one is lowered when being thrown into forward gear. The reversing is done with the McCarroll air reversing mechanism, and there are no



Exhaust Steam Pipe from Low Pressure Cylinders.

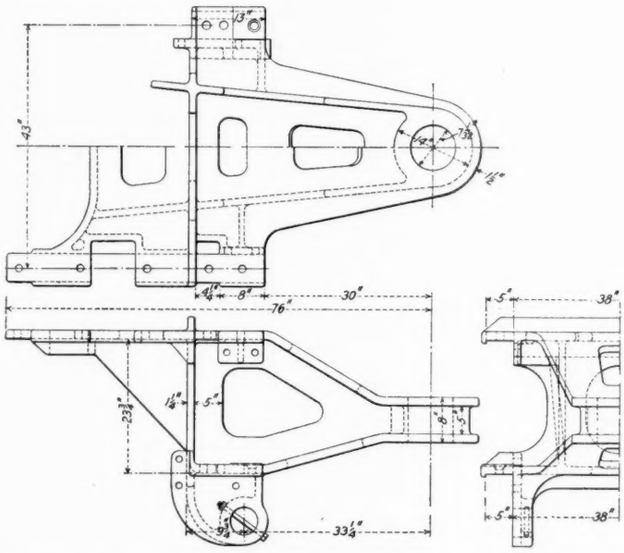


Steam Pipe to Low-Pressure Cylinders.

hand connections attached, so that it is necessary to have an air pressure upon the engine when the gear is to be moved.

Steel castings are used liberally, even lavishly, throughout the whole design. They are used for the cylinder saddles, cross-ties, frame radius rod, frame, guide yokes and a mass of miscellaneous castings.

Some of these details will be made the subject of another article on these engines.



Engine Radius Bar; Mallet Articulated Compound for the Southern Pacific.

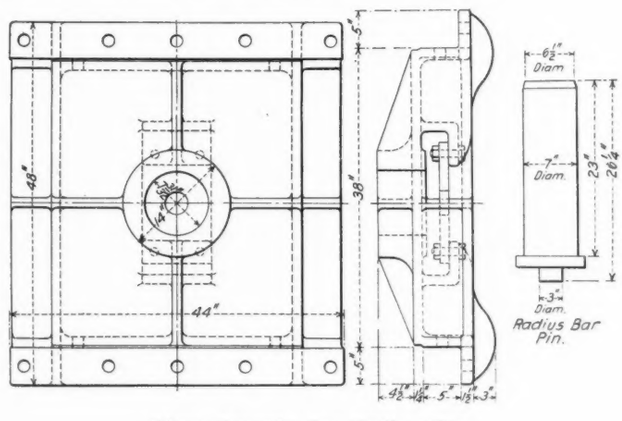
Standard solid steel wheels are used for the front and rear trucks and under the tender.

The fuel is to be oil, and this will be burned with the standard burners of the Southern Pacific Company. It will be preheated by a simple heater consisting of a 1¼-in. pipe leading from the oil tank and passing through a piece of 3½-in. pipe about 7 ft. long that is filled with steam, which is sufficient to raise the temperature of the oil to a point where it will flow freely at the burners.

These engines are sufficiently novel in design to attract a good deal of attention and a corresponding amount of interest will undoubtedly be manifested in their performance. The four-cylinder compound locomotive has been used for a sufficient length of time to have made it possible to estimate very closely as to what may be expected in that direction. With these, the mechanism is very simple, not even an intercepting valve being used, but a direct by-pass valve that must be opened and closed by the driver, for admitting steam to the low-pressure cylinder when starting, so that with the experience of the Great Northern, Baltimore & Ohio and Erie locomotives at hand, there can be no doubt about the efficiency of these new monsters as freight handlers. The points that will come up will be the general efficiency of the boiler as a steam producer when used in connection with the feed-water heater and superheater. The superheater will undoubtedly dry out the high-pressure exhaust and reheat it to some extent; to what extent remains to be seen.

In appearance the engine certainly looks a monster even to eyes accustomed to seeing the large modern locomotives, and only a faint impression of this can be obtained from the engravings and photograph. Probably this impression of size is driven home more emphatically when looking out of the front window of the cab along the running board than from any other point. The boiler occupies nearly the whole width of the cab, leaving a space so narrow that a small man would be rather tightly squeezed to get through, and beyond is the narrow stretch of the running board almost 50 ft. long, or about twice the distance of an ordinary large locomotive. The track ahead is entirely out of sight, and cannot be seen at all on a tangent from inside the cab. By leaning well out at the window it may be possible to see it. Curves to the right come within the range of the engineer's vision some time before they are reached, but he will never see anything of a curve to the left.

For convenience of manipulation, these engines are models, and the labor of operation is reduced to a minimum. The use of oil as fuel practically does away with the manual labor of the fireman, though demanding a high grade of intelligence and skill, while the use of the air reversing gear not only clears the cab of an obstruction, but cuts out the one element requiring exertion on the part of the driver. With the large reverse lever out of the way, it is possible to arrange all of the other levers and valves ready to the hand and in a way to leave a much larger clear space than that usually found in the ordinary locomotive. It is a bold piece of work and well worthy of all the attention that it will receive. It marks, too, the improvements that have been made in recent years in the clearances of the permanent way. It is only a few years ago that one of the arguments brought against the practicability of the development of the two-cylinder compound locomotive was that in order to be available for the heavy work demanded it would be necessary to make the low-pressure cylinder at least 36 in. in diameter, and that this would make the machine too wide to meet the clearance requirements of the ordinary railway. Indeed, as late as ten years ago, when the Richmond Locomotive Works were exploiting the Mellin two-cylinder machine by the "Tramp," that engine could not be run into New York, Boston, Albany or Montreal because of the clearances of the roads entering those places and yet the low-pressure cylinder was at first only 30 in. in diameter, but was afterward replaced by one of 32 in. diameter. Yet here is a locomotive with cylinders 8 in. larger in diameter than that built in Philadelphia and routed to cross the continent on its own wheels. Whether it would be possible to run the engine through the New England states is doubtful, though clearances there are much wider than they were. It may be added, too, that far less trouble was experienced in routing the "Tramp" through the west than in the east, though at times there was some trouble even there. But it shows that wide clearances must be comparatively common now for such a run as these engines are making to be possible.



Pivot Crosstie for Radius Bar.

The following are some of the principal dimensions of these engines:

Cylinder, diameter, h.-p.	26 in.
Cylinder, diameter, l.-p.	40 "
Piston stroke	30 "
Boiler, diameter, shell	84 "
Boiler, thickness, sheets	13/16 and 7/16 in.
Steam pressure	200 lbs.
Fuel	Oil
Staying	Crown bars
Firebox, length	10 ft. 6 in.
" width	6 " 6¼ "
" depth front	6 " 3½ "

Firebox, depth back	5 ft. 10½ in.
" thickness, sides, back and crown	⅜-in.
" thickness, tubes sheet	½-in.
" water space	5 in.
Tubes, material	steel
" thickness	⅛-in.
" number	401
" diameter	2¼ in.
" length	21 ft.
" feedwater, length	5 ft. 3 in.
" " number	401
" " diameter	2¼ in.
Heating surface, firebox	232 sq. ft.
" " tubes	4,941 "
" " feed-water heater	1,220 "
" " total	6,393 "
" " superheater	655 "
Grate area	68.4 "
Wheels, diameter driving	57 in.
" " truck	30½ "
" " tender	33 "
Journals, main driving	11 in. x 12 in.
" trailing driving	10 " x 12 "
" truck	6 " x 10 "
" tender	6 " x 11 "
Wheel base, rigid	15 ft.
" " driving	39 ft. 4 in.
" " engine	56 " 7 "
" " engine and tender	83 " 6 "
Weight on driving wheels	390,000 lbs.
" " front truck	19,000 "
" " rear truck	21,000 "
" total	430,000 "
" engine and tender (about)	600,000 "
Tank capacity, water	9,000 gals.
Tank capacity, oil	2,850 gals.
Tractive effort	94,640 lbs.

$$\frac{\text{Weight on drivers}}{\text{Total weight}} = 90.69^*$$

$$\frac{\text{Weight on drivers}}{\text{Tractive effort}} = 4.12$$

$$\frac{\text{Total weight}}{\text{Tractive effort}} = 4.54$$

$$\frac{\text{Tractive effort x diameter drivers}}{\text{Heating surface}} = 843.81$$

$$\frac{\text{Heating surface}}{\text{Grate area}} = 93.46$$

$$\frac{\text{Firebox heating surface}}{\text{Total heating surface}} = 3.63^*$$

$$\frac{\text{Weight on drivers}}{\text{Total heating surface}} = 61.00$$

$$\frac{\text{Total weight}}{\text{Total heating surface}} = 67.32$$

$$\frac{\text{Displacement 2 h. p. cylinders, cu. ft.}}{\text{Total heating surface}} = 18.43$$

$$\frac{\text{Total heating surface}}{\text{Displacement 2 h.p. cylinders}} = 346.88$$

$$\frac{\text{Grate area}}{\text{Displacement 2 h.p. cylinders}} = 3.71$$

*Per cent.

THE CONNECTICUT RAILWAY CHARTER DECISION.

The case of Mackay and others *versus* the New York, New Haven & Hartford Railroad Company and others, recently decided by the Supreme Court of Connecticut, the highest tribunal in that state, is of exceptional importance in its bearing on the charter powers of a railway corporation holding charters in a number of states. In this case, the New Haven Company holding charters in Connecticut, Rhode Island and Massachusetts had contracted to place its guarantee on shares of the New England Investment & Security Company, a voluntary association organized to hold a large nummer of trolley properties in Massachusetts, of which the New Haven company had secured control. The defendant corporation acknowledged the contract but refused the guarantee on the ground that the Supreme Court of Massachusetts had on May 8, 1908, rendered a decision that such a guarantee was illegal under the Massachusetts law. The lower court of Connecticut had held the guarantee legal and the case went up on appeal to the Connecticut Supreme Court. The Connecticut case was in effect a friendly suit in which the Connecticut court was asked to determine the powers of the defendant corporation under its Connecticut charter as against the Massachusetts decision and the law of that state.

Annexed are extracts from the Connecticut decision written by Chief Justice Simeon E. Baldwin, the other four judges of the court concurring:

The only question presented for our determination is whether the Superior Court erred in enforcing the obligation, in view of the law of the State of Massachusetts affecting that defendant.

A private corporation may be defined as an association of persons to whom the sovereign has offered a franchise to become an artificial, judicial person, with a name of its own, under which they can act and contract, and sue and be sued; and who have either accepted the offer and effected an organization in substantial conformity with its terms (in which case a corporation *de jure* has been constituted), or have done acts indicating a purpose to accept such offer and effected an organization designed to be, but in fact not, in substantial conformity with its terms (in which case a corporation *de facto* has been constituted).

The merger of 1872 (under which the New Haven, Hartford & Springfield and the New York & New Haven companies were combined) was authorized by an act passed by Connecticut in 1871, and one passed by Massachusetts April 5, 1872. VII Private Laws of Conn., 252; Mass. Acts and Resolves, 1872, Chap. 171. These acts were quite similar in terms, except that that of Connecticut provided that "said consolidated corporation shall at all times be subject to the power, control and legislation of the General Assembly of the state," while the corresponding section of the Massachusetts act declared that "said consolidated corporation shall at all times be subject to the legislature of this state as to that portion of its road in this state, as heretofore, and shall be subject to the general laws of this state as to its whole road, so far as such laws may be applicable thereto."

Where several corporations, each of a different state, are so consolidated by the co-operating legislation of those states as to assume a new corporate form and name, the consolidated corporation is, in each of those states, in the eye of the law, as to acts there done or to be done, a corporation of that state. Neither of the states in question could confer upon it the franchise of maintaining a corporate existence in any other state, nor add to nor diminish the powers that it can exercise in any other. O. & M. R. R. *v.* Wheeler, 1 Black, 286, 297; Delaware R. R. Tax, 18 Wall, 206, 228.

The new form of corporate organization exists in each state by virtue of the laws of that state. If, acting within its powers there possessed, it incurs a liability to be there discharged, and upon which it is there sued, it cannot escape its enforcement on the ground that it is also a corporation in another state under the laws of which no such liability could have been legally assumed.

The ultimate loss from a judgment diminishing these rights of property, in whatever state it may be rendered, falls on the same men, and in the same proportions. But this situation is one which the shareholders have voluntarily assumed.

No shareholder in the New York, New Haven & Hartford Railroad Company who consented to its becoming, by consolidations and mergers, a corporation composed of several corporations of different states, can complain that each state regulates its conduct, so far as concerns franchises which it has granted.

Referring to the decision of the Massachusetts court enjoining the New Haven company from directly or indirectly guaranteeing securities of a Massachusetts street railway Judge Baldwin says:

If the injunction which was decreed could be fairly construed to apply to acts of the New York, New Haven & Hartford Railroad Co. that might be done by or for it as a Connecticut corporation agreeably to the laws of that state, or in Rhode Island as a Rhode Island corporation agreeably to the laws of that state, it seems obvious that questions of jurisdiction and of constitutional law might be raised, which could not arise if the decree applied only to acts by or for the company as a Massachusetts corporation, that might be done in or purport to affect rights or property having a *situs* in that state. (Wharton on Private International Law, I, Sec. 477.) In view of these considerations, the observation of the Supreme Judicial Court of Massachusetts that it was entirely immaterial whether the defendant should be described in the decree as a Massachusetts corporation, or as one existing under the laws of three states, apparently implies that it enjoined only action by or for it in the capacity of a corporation existing under the laws of Massachusetts. (See Davis *v.* N. Y. & N. E. R. R., 143 Mass., 301, 9 N. E, 815.)

But whether this be so or not, the courts of this state, in dealing with a Connecticut corporation, cannot accept as an excuse for a refusal to perform a contract, the obligation of which upon it, as such corporation, it expressly admits, the plea that to perform it might violate an obligation which its shareholders have assumed in accepting and acting as a corporation under a Massachusetts franchise.

There is no error.

HANDLING MATERIALS AND ITS RELATION TO COSTS.

BY H. B. WHIPPLE.

Various railways have gotten up figures from time to time to show the relation of material and labor to the total cost of locomotive repairs, with the object of determining a standard percentage basis. One railway claims that the labor should be but 40 per cent. of the total cost, and that the material should be 60 per cent. Another claims that these percentages should be reversed.

The systems of accounting and store department methods differ so widely that the two cases mentioned above might each represent good practice on these two railways. That is, the cost per mile for repairs might be equally good, even though the figures showing percentage of labor and material separately should be so greatly at variance. For instance, one road might manufacture material in large quantities and keep the finished product on hand to supply its shop needs, and the other road might not like to carry so much money tied up in material, prefering to manufacture the parts needed as requirements at the time demanded. In the first case, the finished product in stock carries with it a labor charge which is not considered as labor when the material is charged out, and this is one of the reasons that the material cost runs up higher than in the other case. On the other hand, if the material is manufactured for an individual engine at the time it is needed the raw material is the only material change made, and the labor of making and finishing is charged directly to the locomotive.

There is another feature of the material as affected by accounting methods which is not always thoroughly understood—it has to do with second-hand material, a question of great importance, with possibilities of benefit to the railway if handled properly, yet capable of becoming a farce if not given the constant attention the subject requires. There are railways which charge out the new material, such as for instance a pair of new cylinders, and when, in removing the old cylinders, one is found to be good for further service, instead of giving credit to the locomotive for the second-hand cylinder it is not taken into stock but is kept on hand until needed, when it is used without being charged out. This treatment is carried out with all kinds of material. In this case, the cost of the cylinders may be $800, and this charge is placed against the locomotive in question. The other method of handling the matter, when the credit is given for the second-hand cylinder, would be to charge out $800 to the locomotive and credit 75 per cent. of $400 or $300, which would leave a net charge of $500 against the locomotive. But when the second-hand cylinders were used after being thus credited, it would be necessary to charge them out, which would mean $300 against the locomotive receiving them. If the results for the railway are looked at yearly, the variation in the results of these two methods would be but slight; but, if, as is generally the case, the results are dealt with monthly, there is a possibility of considerable variation.

If the men handling such matters were expert accountants and experienced mechanics as well, either method would do, provided a certain period were decided on to inventory the accumulation of second-hand material and adjust the credits. It would be unreasonable to expect a railway not to inventory accumulated second-hand material, because it would be equivalent to saying the management was willing to carry a stock on hand greater than its book balance indicated.

In accumulating second-hand material, where store rooms are set apart for that purpose it is a difficult matter to avoid accumulating a lot of odds and ends which are of doubtful value for future use; and it is also difficult to get the average man to discriminate between new and second-hand material in charging it out when the system is to charge it out again. When there is a doubt as to the usefulness of a piece of second-hand material it should be turned into the scrap pile, where at least it can bring a known value in return. It is the writer's opinion, after experience in the details of the subjects mentioned, that the most satisfying arrangement would be one which would entirely eliminate second-hand material. When a pair of cylinders is applied and one cylinder is removed that is good for further service, we would charge the locomotive with $800, credit the one cylinder removed, and take it into stock as new material and at the value of new material, or $400. If a shop required one cylinder for a locomotive and it has this good second-hand cylinder, it would not order a new one but would use the old one and would charge it out, not as second-hand but as "one cylinder, $400." We would thus avoid possibilities of confusion due to not having experienced men handling the charges, we would avoid the accumulation of useless second-hand material, and we would insure our charges and book balances being correct. By using the old material in preference to the new the amount on hand would be kept at a minimum. As would be the case with the cylinder, it would generally facilitate repairs to use the old material in preference to the work of fitting up the new.

TECHNICAL JOURNALISM.*

BY RAY MORRIS,

Managing Editor of the *Railroad Age Gazette.*

To an onlooker who is at the same time a participant, two interesting journalistic tendencies stand out plainly in the records of the last fifteen years. The first is the growth of the irresponsible daily newspaper; the second, the development and astonishing prosperity of the highly responsible technical journal. It is probably no serious exaggeration to say that we were indebted to the irresponsible daily newspapers for the Spanish war; I believe we are also becoming indebted to them for a sort of progressive immunity from the sensationalism of great type. But along with the daily object lessons in loose thinking and careless statements that are being cried from every street corner, a radically different journalistic concept, the technical journal, has, from a publishing standpoint, far surpassed the expectations of its best friends in its material progress since 1894, and indeed since 1900.

A short time ago the writer dined with a small group of publishers of technical journals, and calculated that the combined annual advertising revenue of the papers represented at the table was not far from two millions dollars. It was noted by a statistical guest that technical advertising had increased by one-half since 1903, while in the ten years previous to 1903 it had increased only by one-third. These are rather impressive statements, especially in view of the fact that the ordinary, or average, citizen (if there be any such!) has never read a technical journal in his life, while the advertiser, who makes this prosperity possible, does not care if the general citizen never reads one!

What the work is which these papers do; how they do it; whether it is worth while, and who pays them for it—it seems to me that these questions have some general interest.

The word "journal," corruption of the Latin *diurnalis*, means a publication of daily things, and the great daily newspapers, representing general journalism in its most frequent and concrete form, must need catch the drift of a fearful number of these things, and make the best news they can of them, without a moment lost. To the man engaged in the production of a daily newspaper, time is fully as important a consideration as accuracy; usually much more important. Moreover, he must be at least reasonably impartial in his use of material; he must look upon his readers as an audience before his platform, and remember what a hopeless number of kinds of things they are interested in! Were there but one journal in the commonwealth; one London *Times* of the olden

*An address before the engineering students of the University of Michigan.

days, read and remembered by all, it would have to be a general journal, unless all the citizens of the commonwealth were cobblers. If they were, it may be presumed that notes and news of the shoe trade would predominate, yet room would certainly be found for graphic reports of the current scandal, since even a citizen of this highly specialized commonwealth must need be a human being, as well as a cobbler.

But the modern community is characteristically diverse in its interests, and the need for special information, as used by special trades and professions, cannot possibly be met by the general journal without grievous injustice to its readers. The growth of the 60-page Sunday paper, with its financial section offset by picture puzzles, and its real estate section balanced by the adventures of Little Nemo, is an attempt in this direction, somewhat marred by the constant efforts to induce one kind of reader to read some other kind of material. Indeed, the Sunday paper is as good an illustration as need be that the demand for special news and special kinds of information cannot possibly be made adequate by the general newspaper.

To fill this want, the special journal has come into being. For the purpose of this analysis, it is first necessary to divide the field of special journals into two broad groups; work papers and play papers. There are a surprisingly large number of play papers in existence; I suppose even the stale and dreary police court sensationalism to which certain of these papers loyally devote their pages must be classed among the pastimes!

The present discussion excludes this range of journalism entirely, and confines itself to work papers; to journals which are part of the primary or secondary equipment of a trade or a profession. The distinction between a trade journal and a technical journal is not always plain; there is much interweaving between the two, as will be shown. In broad terms, however, I suppose it is fair to say that the technical journal deals with the literature of a profession, or of an industry devoted to the applied use of materials, while a trade journal exists primarily to furnish statistics relative to the sale of raw products or manufactured articles. This will perhaps serve for a definition, although I do not recommend it.

The duty of a technical journal to its readers is to present a current record of the best standard practice, together with such help as may be really illuminating in making practice better. Its duty is to glean in an entirely accurate and trustworthy manner the best things of the East and carry them to the West, and return with an armload of the best things of the West. It must also broaden the specialist so as to make him a better specialist and also a more serviceable man to his employ—whatever that employ may be—through his general understanding of the whole run of questions presented. This work, in its last analysis, is nothing but highly capable news gathering, using the word news in the broader sense than is commonly employed. Comment on this news is also made in the editorial columns, and a technical paper occasionally has a chance to do magnificent original work that abides for all time, because of its high viewpoint and its ability to command the best ideas of the best experts and compare results through a wide territory.

The writer has very definite ideas about the functions of the editorial column of a technical paper, or, indeed of any other kind of paper. I had occasion some time ago to make a careful study of the files of the New York *Herald* and the New York *Evening Post* for the year 1837. At that time I suppose the news gathered by one of these papers would fill an average of three columns, and the editorial comment would fill just as much space, or a little more. The editorials were magnificent, great things, to be classed with the three-volume novel and the two-hour sermon, and people read them. In the *Evening Post* to-day there are leading editorials covering somewhat less space than was filled by those in the big columns of 1837, while the news departments have expanded to fill some seventy-five columns of the present paper. To-day's *Herald* makes the point emphatic; it has eighty three columns of news, and one leading article nine inches long.

In a word, people have come to realize that it is a great deal better for them to be supplied with news and to make their own comment, than it is for them to be supplied with comment and have to make their own news!

This state of affairs is true to a high degree in a technical journal. I do not believe it ever pays to preach sermons in the editorial column, although that is the first instinctive desire of every man we take on our staff. The editorial column, if properly conducted, will be the crowning glory of the paper, but it will be so because a host of important collateral facts and outside study are brought to bear on some important subject at hand; not because the editor passes endless judgments on matter at hand without having any new information whatever, a process which may be called robbing the news. Nowadays, why you think things, is more important than what you think!

Yet I have no doubt that trade news, ranging from frothy gossip to a dignified and highly condensed compilation of orders and contracts, or to case abstracts, as in a law journal, is the work which brings technical papers the greater part of their readers. Quotations, or prices-current, furnish an additional field of the highest importance in the case of a financial paper, or of the characteristic trade journal in an industry subject to constant price fluctuation, such as the sugar trade. Again and again I have seen technical journals, edited with great skill and responsibility, fall short of prestige, and incidentally of earnings, because they failed to give due regard to this work-a-day feature of expert and critical news gathering. From this fact arises the curious anomaly that a technical journal not infrequently makes its living, acquires a host of readers and firmly establishes itself in dignity, power and responsibility from its purely trade journal departments.

The situation may be summed up by saying that every modern profession, industry or business (however these three descriptive titles may be differentiated) has absolute and urgent need for accurate, highly specialized news, and knows well that it has. Every profession, business or industry under modern conditions also demands increasing education and fitness on the part of its representatives, but the number of those representatives who know that they need education and systematically set about acquiring it is one-tenth, or perhaps one-hundredth, of the number of those who are eager for the acquisition of special news. Consequently, it is quite idle for a paper to say that it wants to be a great lyceum of information and discussion and does not want to cumber itself with news; unless it devotes time and brains and dollars to its news departments. nobody will come to the lyceum. This fact is often overlooked in consideration of the work of a technical journal, perhaps because the divine carelessness of the daily papers in their news gathering has cast a shadow over the industry.

This is the theory that underlies the news department of the technical journal, and the journal cannot be great without it. Yet, with the finest news department in the world, and with only that, the technical journal would be no further along than the trade journal, and the great technical journals of the country go far beyond this for their high reputation and their broad dignity.

The theory of the scientific part of the paper, already briefly touched upon, may be summed up by saying that in the present stage of abounding human industry, text books cannot keep up. The surgeon prepares himself to practice by laborious study of a certain set of principles sufficiently well established so that they are available in bound books, and when he has mastered these principles and the supplementary comment given by the lecturers, and has acquired technique by hospital work, he is for the moment abreast of the current stage of his science, but in order to remain there he must depend on what he acquires from conversation and from the technical journals of his profession. The same thing is true of the lawyer. Text

books give him his fundamentals; cases, his present-day knowledge, and case reports constitute the principal tools with which he works.

The essentials of information in the transportation and engineering fields and the forms in which it is desirable that this information should be presented, bear, from an educational standpoint, a fairly close resemblance to those in the medical and legal fields. Once the principles have been mastered, the successful manager, or civil engineer, or locomotive designer, wants to know about every application of these principles which is in any important respect an advance on established practice. No books can give this information; like the printed catalogue of a great library, the additions and supplements which would become indispensable while the original work was in the printer's hands, would make it out of date before it left the presses. The card catalogue method has almost universally succeeded the printed book method of preparing records of this kind, because of its flexibility, and the technical journal, for the same reason, has succeeded the text book in supplying a very large part of the special, technical information that the world needs.

What has just been said applies primarily to the technical journal as a professional man's tool; to the part of its usefulness that enables a man to have all current facts at hand that possess important bearing on the specific task at which he is engaged. But there is another important aspect of the educational feature which works out in a different way. The highly specialized conditions under which modern industry is carried on do not all tend towards efficiency. The members of the leather workers' guild in an ancient German town considered themselves specialists, but they could see with their own eyes the accomplishment and fruition of their labor; they did not work at a branch of a branch, the way the man does to-day who operates the machine that stamps eyelets into counters that are stitched into shoes by other machines, further down the line. Consequently, although their fingers lacked some of the hopeless, heartless deftness that comes from performing piece work under conditions of incredible repetition, they were greatly interested in what they were doing, and if the final, finished product was not perfect, their concern was immediate.

The factory hand who spends all his days upon a minute detail has no concern whatever in the finished product, and so long as he cannot himself become a perfect machine, the finished product is going to suffer on that account. The same thing is shown even more clearly in the conduct of an industry involving a huge organization, the individuals of which have tasks which vary instead of tasks which are fixed.

This point can readily be illustrated in the management of a railway. If the line is twenty miles long, and the President is also General Manager, General Superintendent and Chief of Motive Power, he is going to know all that is done by every employee, and every employee is going to be interested in doing his work well and efficiently, because he comes in direct contact with the Old Man, and his share in the movement of the whole transportation machine is tangible and produces results. But this twenty-mile line now-a-days is apt to be part of a five-thousand-mile system, and specializataion brings in bad results for the individual, although it produces important economies. The Superintendent of the Great Valley division is a past master in turning out record trainloads, but he has long since forgotten that big trainloads are not the beginning and end of making a railway profitable. The statistics of his train and car loading go straight to the general offices and look good, but the harm done in the traffic department by these big loads—in this case assumed to be excessive—is not measured graphically. The master mechanic overlooks the fact that the percentage of time his locomotives spend in the shop is not the only criterion of his efficiency; the work they do on the road is also important, though not recorded on the same sheet, but it is not his specialty. The ticket agent ought to remember, though he usually does not, that his work has not been well done, no matter how quick he is and how free from error, if he has sent a passenger to a rival line by his personal discourtesy.

So, after the technical journal plays its part in making a specialist, its most valuable function is to unmake him again, at least to the extent that he shall view himself and his individual work as part of tne general scheme of work for which his company exists. It does not accomplish this by preaching, but by showing in its own form and makeup the respective proportions of the specialist's branch and of the entire work of the railway. Where an operating officer has the chance to take his lunch every day with the traffic staff, and has time to do a little talking and a little listening afterwards, it makes him a better operating man; and his technical journal will likewise make him a better operating man, because the traffic man and the master mechanic and the car builder and the comptroller, as well as the owner and instigator of the competing trolley line, are gathered together between the covers, and have called on the editor of the paper to help them put their ideas into English that is not too hard to read.

It should be said, parenthetically and apologetically, that the editor of a technical journal has to change radically certain fundamental literary ideas, as, for example, that a contributor is entitled to just the statements that he signs, and that the editor's function is to accept or reject, but not to change, a signed statement. This is the theory; the practice is that the editor gets hold of a speech made by a master mechanic whose language has never really caught up with his ideas, and he works for a while with blue crayon, and then takes to using scissors and paste-pot, and then gives that up and dictates the master mechanic's remarks himself, not from the fullness of his wisdom, but from the fullness of his language, while the master mechanic, when he sees the address in print, is surprised and highly pleased to learn that he can write so well.

Reference has been made to the extraordinary growth of advertising in technical papers as one of the very interesting journalistic facts of the past few years. This increase in earning power has had the direct result of giving the subscribers to most papers a great deal more value than they pay for. The subscription price of the *Railroad Age Gazette* is $5 per year, but it costs us over $17 a year to supply each subscriber with his paper. The fact is plain, and without dispute, that the advertiser pays the bills, or most of them—a situation which is at once the strength and weakness of modern technical journalism.

What does the advertiser expect in return for this payment; or, more definitely, what does he get?

Upon the answer to this question depends the reputation of every newspaper and magazine, but temptation comes to the technical paper more constantly and more insidiously, I believe, than to any other paper in existence.

The A. & B. Railroad has issued some short-time notes on its heavily overcapitalized property, the object of the notes, in plain language, being to pay unearned dividends. Grogson & Co., bankers, have underwritten this issue on a basis very satisfactory to themselves, providing they can dispose of the notes, and have therefore published a full-page advertisement in the *Investors' Home Companion*, a young and hopeful financial paper which has only recently come into the field, already well filled with like papers. What comment is the *Investors' Home Companion* going to make on these notes in its editorial column? The case is one in which honesty and reputation seem to be engaged in deadly warfare with present prospects!

The lines on which this battle should be fought are clearly shown. Very well, then, consider the following case: A technical paper devoted to the interests of transportation believes fully and freely that it is part of its righteous work to show useful new devices which have recently been put on the market, so that those whom these devices might help in their work may know about them. This journal receives a large

advertisement from the manufacturer of a device which is on the border line between usefulness and foolishness, with the request that this device be shown (not praised) in the editorial columns. What is the editor going to do about it? Is he going to decide that the machine is useful if its owner advertises in his paper and foolish if its owner does not, and, if so, is he going to show the device in his reading pages? Will he show it with or without the little *advt.*, which the daily newspaper sometimes uses as a mark of designation?

There is an ancient and dishonorable word used to describe this kind of practice when shoved just a little more plainly into the light, and that word is blackmail. Yet it is perfectly astounding how many well-meaning technical journals are guilty of this special form of blackmail in greater or less degree, simply because the difference between right and wrong even in the abstract is very ill-defined. To cite an instance of this: A certain machine was designed some years ago, which is now in use on a number of railways and which saves untold hours in making statistical computations. The mechanical principle of this machine is based on the same idea as that of the machine which receives a pasteboard card stamped full of holes and shows in electrically illuminated figures a carriage number in front of the theatre.

The editors of the best technical journals were convinced that their people ought to know about this machine, and they did not hesitate to print illustrated descriptions that filled several pages, in entire disregard of the question whether or not the machine was advertised in another part of the paper. Here was a clear case on one side of the ethical line. A clear case on the other side would be a "write-up" of some article, such as a hand-saw, a laborious description of which could be of service to to one except the owner of the trade name under which this particular kind of saw was manufactured.

There are two ways of getting around this particular pitfall with honor. One way is to edit strictly all such material and make no distinction between devices from advertisers and those from non-advertisers. The principal objection to this method is that the kind of editing that this kind of copy needs is a sure road to real, durable unpopularity with the people whose devices are shown.

I believe we have found a better way. We have transferred this department bodily from the editorial staff to the advertising staff, and we print it next the advertising pages, in distinctive type, so that it shall not be confused with editorial matter. This method has two advantages; it is honest, and it is popular. Many people have supposed that honesty and popularity never met each other between the covers of a trade journal, but we have made them the best of friends!

It may be seen that undue stress is being laid on the problem of the manufacturer's "write-up." But the manufacturer's "write-up" is the great problem of high-class technical journalism—the rock on which many a journalistic reputation has struck. And between the ways of doing these things that are clearly right and the ways that are clearly wrong there lie any number of cases where ethics throws up her hands and leaves it to the editor!

But there is a redeeming feature of all this. I do not know of any kind of business where it is more unerringly true that from a purely commercial standpoint honesty is the best policy. A paper that is known to print blackmail advertising very soon reaches a stage where it cannot get any other kind, and this sort of thing very quickly becomes common knowledge; consequently the host of papers making their living to a greater or less degree upon unfairness and advertising blackmail eke along a wretched existence, respected by none and sympathized with by none, and in the long run of years they are never serious competitors of the papers with clean hands.

The necessary weaving of the trade journal into the technical journal is another direct result of the support given by the advertiser, and a very desirable one. Every profession has a supply of trade attached to it—even a minister of the gospel has to have Bibles and white bands—and it would indeed be a curious anomaly if the excellent advertiser did not occasionally clamor for the special news of his own trade in the magazine which deals with someone else's profession but which he himself supports. Hence it is that flourishing departments of notes arise, such as:

"Mr. Jacob Kruse, of the Kruse Bird Cage Wire Company, sailed for the Mediterranean Saturday on the 'Princess Irene.' He is accompanied by Mrs. Kruse, Miss Violet Kruse and little Jakey, and will go from Naples to Rome, Florence and Venice, returning on the 'Cretic' early in the fall."

Without discourtesy to the excellent Kruse family, it will probably be conceded that the value of this news as *technical* information is not far-reaching, yet Mr. Kruse likes it better than any other item in the *Brass Herald*, and carries a kindly feeling in his heart toward that paper on account of it. Its worthy competitor, the *Brass Manufacturer*, takes a lofty stand; it has no space for personal gossip, and tells Mr. Kruse so, more or less frankly. It explains to him its readers are interested in only three things—brass manufacture, orders and prices current—and that the people he sells goods to are more concerned with his wire than with his family, even including little Jakey. But when the fall advertising campaign begins the Kruse Bird Cage Wire Company forgets that the *Manufacturer* has the most readers and a higher class of subscribers; it remembers the personal notice and gives the *Herald* a page of advertising and the *Manufacturer* a quarter-page!

From an advertising standpoint, Mr. Kruse is in error. He is making his principal announcement in the paper which *he* reads instead of in the paper which his customers read. But the error is a very common one. The supply men are keenly interested in each other; they read with the most pleasure that paper which best satisfies their personal interest and overlook the fact that the customer whom they wish to reach may have only a moderate interest in their affairs. So the serious-minded technical paper has this always to contend with, and it is fortunate indeed if it is able to dispense with the Personal Vanity department entire.

My own theory in this matter is that if a news department can be made really good, with real trade news, it will interest and awe the Jacob Kruses and, in turn, will escape the daughter violets and the little Jakeys. And so far it has worked. Our paper used to be conspicuously weak in its news department. We used to believe, and I think with justice, that we were covering in a fully adequate manner the professional part of our work. We believed that the news department was secondary, and by carrying out that belief faithfully for a number of years we succeeded in making ourselves quite unpopular with a large number of advertisers and subscribers as well. Our solution of the problem was to admit that the technical journal of the present day, supported almost entirely by a certain trade, has got to give that trade the news which it wants. Now, therefore, a copy of any one of our issues is really two entirely separate and distinct papers living together under one roof. In the front, a critical review of railway operation; in the back, the best railway supply trade newspaper that we know how to make.

Josh Billings once observed that he had had a great deal of trouble in his life, most of which never happened. Much of the news in the very best daily newspapers never happened, either, and the amount of chaff which a critical news gatherer has to separate from this journalistic wheat is one of the surprises of technical editing.

Yet it is equally true that the horde of news gatherers who swarm over this land like locusts do get substantially all the news there is every day. The difficulty is that they get so much news which there is not! Nobody seems to hold a general newspaper responsible for this kind of thing, but a technical journal must tell the truth and nothing but the truth. If we report that the National Lines of Mexico are in the

market for equipment it is going to cost the equipment companies a great deal of money to follow up that order, because Mexico is far away. Follow it up they surely will, however, and if the National Lines of Mexico turn out not to be in the market after all, does anybody doubt that we are going to hear about it from the equipment firms? If those firms are going to use a technical news service instead of going to the very great expense of providing a news service of their own—and an enormous number of them are coming to do so—the news has got to be right—a situation which the daily newspaper is spared, because nobody takes its findings too seriously.

Without going into the details of the way in which a technical news department analyzes the material brought into it it may be noted, briefly, that it relies on correspondents all over the country, on the work of its own staff and upon the daily press, supplemented by a follow-up system, by means of which every doubtful item can at once be tested. The men in charge of various columns have learned by long experience which of the newspapers are most accurate and which are the stuff that dreams are made of. There is one daily newspaper in New York City, and none west of New York City, from which the *Railroad Age Gazette* takes important railway news without confirming it. There are two others in New York, one in Chicago, one in Boston and one in Springfield, Mass., which are careful about their news, in the sense that they will lose a sensation rather than take a chance. As for the rest of them, it is perfectly astounding to see the total lack of responsibility which crops up again and again in the news paragraphs of the day.

May it not well be true that the doctrine of responsible statement and weighed utterance, which is the life of a technical journal, can be spread by that means? There is a good deal of helter-skelter in the American temperament, and the principle of the short cut, to which much of American invention is owed, is not always happy in its outworkings. Has not the great nucleus of responsibility in the technical journals possibilities of public service?

We have often described our own paper as being a normal school for country newspapers. Even during the years of strongest opposition to corporations in general, and the railways in particular, we have been astonished at the number of newspapers, east and west, north and south, that have quoted from our editorial comment, or appropriated it entire, with or without credit. The amount of this rather expert comment on transportation affairs which would appear in those papers would not be a sufficient proportion of the total contents of the paper to have any very lasting effect on the minds of its readers, but the significant thing was that the people supplying news to those readers and making comment on the news had gotten in the habit of looking to the technical papers for certain kinds of facts and certain kinds of discussion. I believe it would not take a very wide extension of this principle to be of incalculable benefit to the general range of American journalism, and I believe this extension will come. I believe that the growing production of careful, scientific literature, especially in a form like that of the technical journal, where it can be gotten at, is going to have its effect in making careful newspapers all over the country scrutinize their news, and that the effect will be important.

Life in the office of a technical journal is not all as solemn and joyless as these paragraphs might suggest. The scrutiny of incoming news is sometimes applied for other purposes than those of copy-making. It is inspiring, for example, to read a paper devoted to the fur trade, and to learn that good quality electric rabbits will be in great demand, or to encounter in a textile journal a paper on the twister motions of self-actor mules! We noted recently in the *Shoe and Leather Reporter* a paper on the best way of barring the throats of gypsy bals, and from a paper devoted to the grocery trade we are always glad to learn that spot prunes are dull or active, as the case may be; that tomatoes are stagnant, cabbages firm and potatoes quiet. We have felt from personal experience that potatoes were quiet, and have cherished in secret the belief that prunes were dull, but it is a satisfaction to receive scientific confirmation of these impressions. A mere glance at these headings gives ready demonstration that if people must know about these things they have grave need for the special journal!

What worldly opportunity does a technical journal give to the people who are working on it as compared with the opportunity in other lines of endeavor? The answer to this, as to a similar question applied to almost any business or profession, is that the opportunity is largely what the worker makes it. It is possible and easy for the man working on the editorial end of a technical paper to get into a rut. The work at the outset seems to him extraordinarily difficult because of its intense technicality, but, this mastered, the routine path becomes easy. The question before the young technical editor is, How far can he break away from the routine that so easily entangles him and do something worth while with the means at hand?

There are two ways in which the career of a technical editor can be considered, as an end or as a means. As an end in itself the actual income possibilities of the position are pretty good, and have been improving very rapidly during the last ten years. The editor of a strong technical journal will get somewhat higher pay than a rear-admiral, and although this in itself is not large, as measured by the compensation which goes to the successful merchant, lawyer or engineer, the best technical journals offer very promising opportunities for investment in their own businesses, of which the man important to his company will probably be able to avail himself at considerable profit.

Editorial salaries on the best technical papers are neither higher nor lower than those on the standard monthly magazines, and the chance for the editor to acquire a holding is rather better than in the case of the old and well-established monthlies, because it must be remembered that the great growth in prosperity of the technical journals is a very recent thing. The *Railroad Age Gazette* is over fifty years old, but its growth can be divided into three geologic epochs, which are of considerable interest, from a commercial, as well as from a literary, standpoint. The first period was that of the broadside sheet for circulation in hotel lobbies, eking out a precarious existence and of no account whatever so far as serious editorial work was concerned. This was a comparatively short period, for clear-sighted people saw a chance to make a paper which was worth while. The next period was one of some twenty-five years, in which the solid, substantial editorial work done by the paper was far and away beyond the substantial commercial recognition. The most recent period, less than ten years old, is that of a great accession of prosperity, due to the fact that advertisers have realized that they need have fewer salesmen on the road, particularly to do the important preliminaries toward getting contracts, if they will make free use of the technical journals that go to the very people they most want to reach, and go to them in their leisure hours. Nobody knows how far this period is going to extend, because it is making rapid advances year by year and quarter by quarter.

In short, the editorial opportunities of the technical papers are fairly good and the commercial opportunities are better.

The indirect opportunity which an editorial position on a strong technical journal offers is in some ways greater than the direct opportunities. If a technical editor does not qualify as a first-rate expert in his own line of endeavor it is his own fault. It is no exaggeration to say that he has in many respects a better chance than the men who are directly engaged in the work which he is watching and reviewing. He gets a little better perspective of the work at hand from the very fact that he is not so close to it. In the case of my own

paper there have been two recognized lines of activity into which men developed from the editorial staff. Manufacturers learned a good many years ago that the extremely wide acquaintance which a technical editor develops, combined with the real knowledge which he requires for the conditions of his technical field, were an asset to them if they wanted to sell goods to that industry. Consequently, a number of our editorial people have left our employ to take important positions in the selling end of manufacturing houses which made railway supplies.

The other line of work for which our editorial opportunities qualify specially well is private banking. The editor has an opportunity almost unequaled to observe properties, to learn how they are really conducted and to acquire practical tests which he can apply to determine whether or not they are properly maintained and whether the operating force is efficient or not very efficient. This first-hand knowledge of properties is of great value to a banking house which deals in the securities of those properties, and when this knowledge is possessed by a man with the right sort of mental equipment it makes him a candidate for high-priced positions in the business that is perhaps the most lucrative of all businesses.

To sum up, I believe it is rather easier for a man to get lazy in the editorial office of a technical journal than in most other businesses, for the reason that it is possible for him to produce a vast amount of work which is not quite bad, but which certainly is not good, yet which is not particularly subject to criticism—it simply is not read at all by anybody! The young technical journalist has to fight sternly against this danger. If he conquers it and qualifies himself to write things which have to be read, because people cannot afford to pass them by, he will have no occasion to worry about his opportunities; they will come at him from every corner!

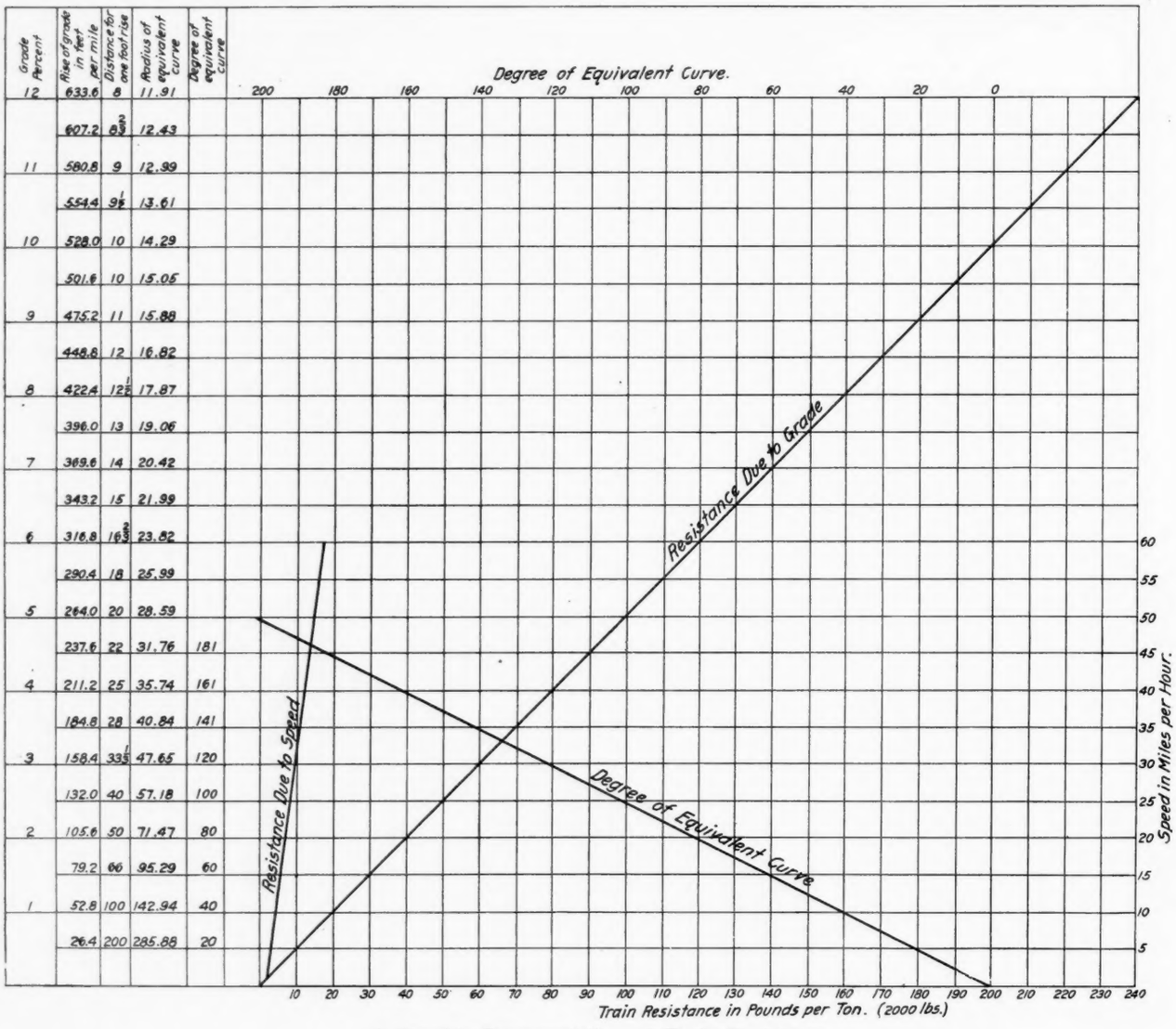
GRAPHIC PRESENTATION OF TRAIN RESISTANCE FORMULAS.

BY SIDNEY C. CARPENTER.

The table and diagram bring together, in compact form for reference, a number of formulas for train resistance, grades and curves. At the left of the table is given the grade per cent., which equals the rise in 100 ft., the number of feet of track for 1-ft. rise, the rise in feet per mile, the radius of the equivalent curve and the degree of curvature. The values are calculated for every ½ per cent. up to 12 per cent., and are arranged so that they can be readily compared.

In the body of the diagram is given the train resistance due to grade and speed and also the degree of the equivalent curve. In the table of formulas each quantity is given in terms of

Grade Percent	Rise of grade in feet per mile	Distance for one foot rise	Radius of equivalent curve	Degree of equivalent curve
12	633.6	8	11.91	
	607.2	8⅜	12.43	
11	580.8	9	12.99	
	554.4	9½	13.61	
10	528.0	10	14.29	
	501.6	10	15.05	
9	475.2	11	15.88	
	448.8	12	16.82	
8	422.4	12½	17.87	
	396.0	13	19.06	
7	369.6	14	20.42	
	343.2	15	21.99	
6	316.8	16⅔	23.82	
	290.4	18	25.99	
5	264.0	20	28.59	
	237.6	22	31.76	181
4	211.2	25	35.74	161
	184.8	28	40.84	141
3	158.4	33⅓	47.65	120
	132.0	40	57.18	100
2	105.6	50	71.47	80
	79.2	66	95.29	60
1	52.8	100	142.94	40
	26.4	200	285.88	20


Degree of Equivalent Curve.
200 180 160 140 120 100 80 60 40 20 0
Resistance Due to Grade
Resistance Due to Speed
Degree of Equivalent Curve
60 55 50 45 40 35 30 25 20 15 10 5
Speed in Miles per Hour.
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
Train Resistance in Pounds per Ton. (2000 lbs.)

A Graphic Representation of Train Resistance.

each of the other quantities, so that if one is known any of the others may be found directly.

If it is required to find the radius of curve equivalent to a certain per cent. grade it may be found at the left of the diagram, where the radius is given in feet for every ½ per cent., or, from the table, the radius is found to be equal to about 143.2 P. If the degree of curvature is required, the table gives it as equal to 40.16 P, or it may be found at the left of the diagram. In the body of the diagram it may be found by reading horizontally from the required grade per cent. to the diagonal line marked "Degree of Equivalent Curve," and then vertically to the scale at the top of the diagram.

If the train resistance is required, read horizontally from the required grade to the diagonal marked "Resistance Due to Grade," and thence down to the scale at the bottom. The resistance can also be found from the formulas given in the table.

If resistance due to speed is required, read horizontally from "Speed in Miles Per Hour" at the right to the diagonal showing resistance due to speed, and then down to the scale at the bottom. This speed resistance curve is from the formula $R = S/4 + 2$, where S equals speed in miles per hour.

Comparison of Grade and Curve Formulas.

	M.	P.	D.	R_c.	C.
M Rise of grade in ft. per mile.	.....	52.8 P.	$\frac{5,280}{D}$	$\frac{7,563}{R_c}$	1.32 C.
P Grade percent = rise in 100 ft.	0.0189 M.	.....	$\frac{100}{D}$	$\frac{143.2}{R_c}$	0.0249 C.
D Distance for 1 foot rise.	$\frac{5,280}{M}$	$\frac{100}{P}$	.....	$0.698\,R_c$	$\frac{4,000}{C}$
R_c Radius of equivalent curve.	$\frac{7,563}{M}$	$\frac{143.2}{P}$	1.432 D	.....	$\frac{5,730}{C}$
C Degree of equivalent curve.	$\frac{M}{1.32}$	40.16 P	$\frac{4,000}{D}$	$\frac{5,730}{R_c}$	.....
R_m Resistance due to grade or curve	.3788 M.	20 P	$\frac{2,000}{D}$	$\frac{2,864.86}{R_c}$	.5 C

RAILWAY REGULATION IN HOLLAND.

By reason of the unsatisfactory results of operation of the railways of Holland, the government has appointed a committee to inquire into the whole situation and report upon what should be done to improve conditions.

The government of Holland finds itself seriously embarrassed by the conflicting policies with which it has forced the railways to contend. While compelling competition between the railways, the government has nevertheless interfered to force expenditures and prevent economies. All the time, the state has avoided any guarantee of dividends to stockholders, and now seeks to avoid the logical result of its policy—taking the railways over to complete government ownership.

The essential features of the railway situation of Holland are these:

1. The government owns the 1,107 miles of line. Two private companies supply the rolling stock and operate the two systems into which the lines are separated, paying the government a fixed rental per mile, as well as a share of the profits in excess of 4 per cent. The gross investment of the state in its lines of railways amounts to about $150,000,000, upon which the revenues of the state from the companies amounts to less than $1,750,000—or little more than one per cent.

2. The two operating companies are forced to compete, both as to export and domestic traffic. Each company has running rights over the tracks of the other, thus making routes to leading inland towns or frontier stations available to both companies. The result of this policy has been a duplicated and excessive train service, which has seriously burdened the finance of both companies. Had the companies been free to do so, they would, it is understood, have sought to effect economies by checking the redundancy in service. But, in projecting any change in their time-tables, they had to reckon with a possible veto from the Railway Minister, himself bound by the state principle of enforced competition. The companies realize that to increase rates and charges is not practicable, but they are insisting that greater latitude should be allowed to them in effecting economies, more particularly in suppressing unnecessary trains, in running trains at reduced speed, and in simplifying time-tables generally.

3. The government has exceptional regulatory powers over operations. All tariffs and all train schedules must be approved by the Railway Minister; no important improvements and no purchases of new rolling stock can be made without the same authority.

4. The government also has the right of intervention in labor disputes between the companies and their employes. All questions of wages and conditions of labor must be approved by the state. The immediate result of this policy was that the men got higher pay and reduced hours of work, and that the expenses of the companies were increased between $200,000 and $250,000 a year. While this increase was virtually forced by the state, the companies have voluntarily incurred large expenditures in new freight stations, docks, sidings, heavier locomotives and finer passenger cars, as well as in the building of several splendid passenger stations. An involuntary addition to expenses has also been due to the increasing cost of materials, the price of coal alone having increased $1.25 per ton in twenty years.

5. If the government desires, it may take over the companies upon twelve months' notice at any time up to 1915, by paying an agreed price. On the other hand, if the railways become so unremunerative that for two years in succession they can pay dividends of no more than 3½ per cent., the companies can force the state to take them over upon an agreed valuation.

The companies paid only 3½ per cent. in 1907, and the results for 1908 were almost equally bad. The companies may soon be in a position, therefore, to compel the state to take them over. The government of Holland, however, is extremely reluctant to take this responsibility upon itself. Apart from the financial considerations involved, the government does not welcome the idea of having to deal with 30,000 railway men as state employes.

The Royal Commission, which has been appointed accordingly, is to deal with the question of the entire railway policy of Holland, advising particularly as to how far it is desirable that the state policy should be revised, with a view, first, to improving the financial position of the companies, and, secondly, of rendering unnecessary a resort to complete government ownership.

In a review of the railway situation in Holland, Edwin A. Pratt, the English economist, writing in the London *Times* of March 19, says:

"In well-informed circles in Holland, it is asserted that leading members of the government are prepared to admit that state control over the railways and the enforcement upon them of mutual competition have been carried too far. It is also believed that the appointment of the Royal Commission is favored both as an excuse for reconsidering past policy and as a possible means of avoiding revolutionary changes in ownership, by allowing the companies an opportunity alike to effect their desired economies and to operate, in future, more in accordance with economic laws and ordinary commercial principles."

On the 26th of September last on the Berlin Elevated Railroad, an accident occurred, resulting in the fall of a car from the structure and the killing of 18 and wounding of as many persons. The "conductor" was prosecuted in a criminal court, and the court held, that the accident was due to his negligence

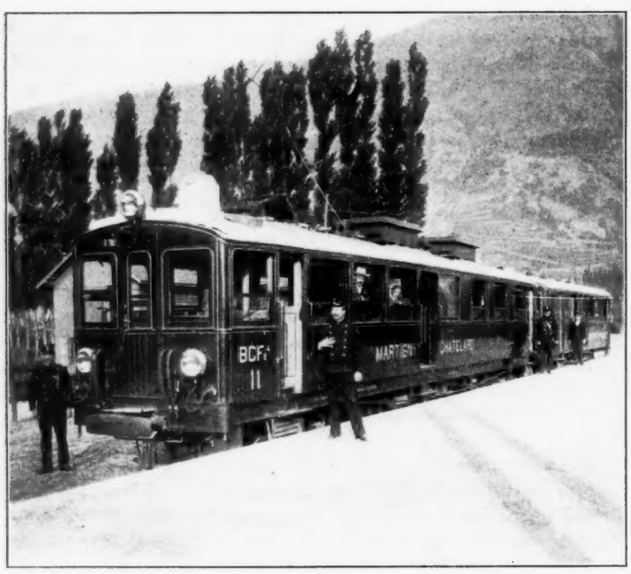
in over-running a signal; and sentenced him to 18 months' imprisonment. Among the victims of this accident was a daughter of Dr. Alfred von der Leyen a high official in the railway ministry, and known here by his work on American railways.

THE CHAMONIX-MARTIGNY ELECTRIC RAILWAY.

BY C. VAN LANGENDONCK.

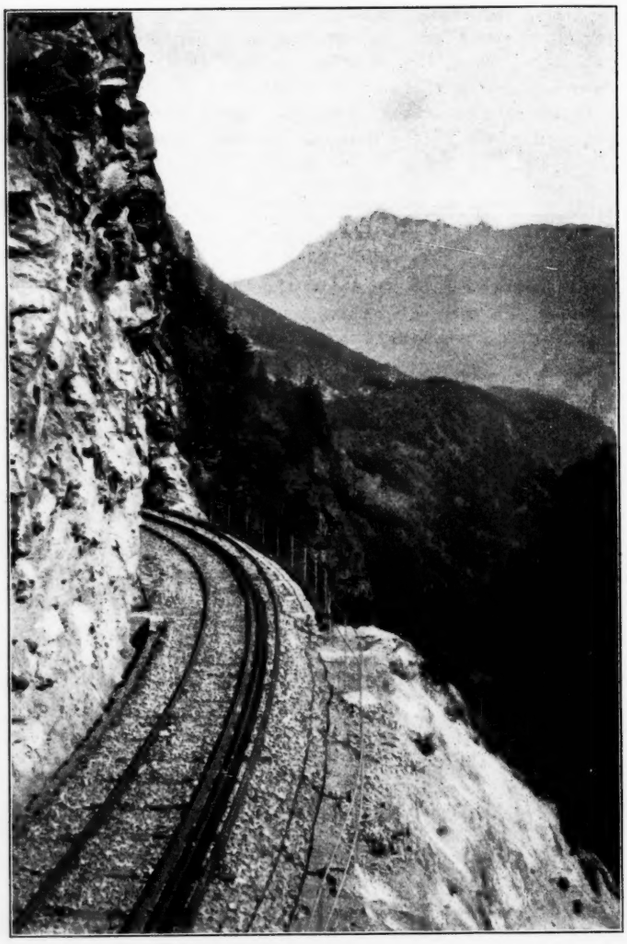
The Chamonix-Martigny-Chatelard Electric Railway enables a tourist to make a three-hour trip through the Alps from France into Switzerland. Former routes required about nine hours to make this same trip. The line is narrow gage. Continuous current at 600 volts is fed to an elevated third rail from power stations along the route. The current conductors are carried on poles spaced nearer together than usual on account of the weight of the wires. That part of the line which is in Switzerland is provided with a rack and third rail electric power is used through France.

The first section of the line from Chamonix to Argentiere is five miles long and has intermediate stations at La Praz and Les Tines at the foot of the Mer de Glace. The mountainous character of the line begins about three and a half miles west of the latter place. Argentiere is a fair sized village and the huge glacier of the same name descends into the valley of the Arve between the Aiguille Verte and Aiguille du Chardornet. The line between this point and the Franco-Swiss frontier is five miles long, the route mainly following that of the new Tete Noire. After leaving the station at Argentiere, the line passes near the glacier then ascends the gentle slope of a cold morain and then curves eastward towards the col de Balme. Opposite the village of Frasserands, the line doubles back to the west, and after crossing the Arve river for the last time over a masonry viaduct, enters a tunnel under the col des Montets about three-quarters of a mile long. Owing to the



Train at Martigny Station.

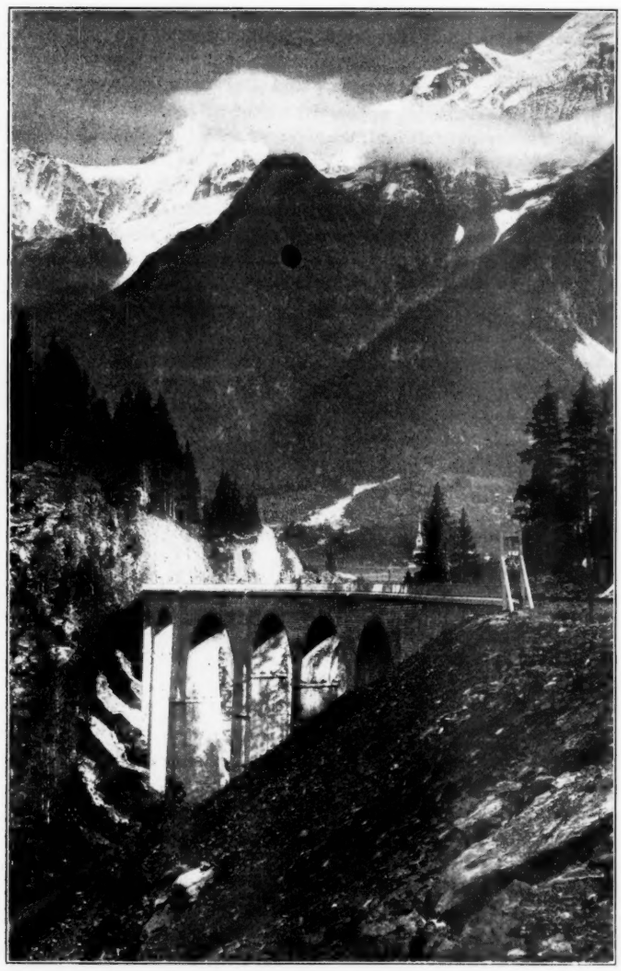
hardness of the rock, the piercing of this tunnel proved to be a difficult undertaking. On leaving the tunnel the line enters the valley of the Eau Noire and continues over a fairly level country until it arrives at the scattered village of Vallorcine, where an international station is located. Vallorcine is shut in on all sides by mountain peaks and here the tourist has a last view of the summit of Mt. Blanc. From Vallorcine to Chatelard, the line runs close to the river and the valley grows steadily wilder, deeper and narrower, and the line crosses the stream near the junction of the Eau Noire and Barbernie rivers. Beyond this point, the line runs through a narrow valley and for a distance of about one and one-quarter miles it runs on a rock-fill which terminates in a tunnel 334 ft. long, through a rocky spur. A short distance beyond the tunnel the railway crosses the wagon road and the river over a steel bridge and connects, with the Swiss end of the line from Martigny, at Chatelard, on the boundary line between France



Section of Chamonix-Martigny Line on Side of Mt. Lachat.

and Switzerland. There are several switchbacks between Argentiere and Chatelard. The respective altitudes above sea level of these two places are 3,963 ft. and 3,484 ft., the fall of nearly 300 ft. being towards the north. At Chatelard, the two wagon roads to the Rhone valley separate; one going southeast, crossing Tete Noire to Martigny, and the other almost due north to Vernäyaz, via Finhaut and Salvan. The railway keeps fairly close to the latter road. This road, which is very narrow and practicable only for light vehicles, is much more picturesque than the other one. After leaving Chatelard, the railway borders the base of the mountain, running through dense pine forests and over rough and rocky open ground. Along this section, the grade becomes greater, and after threading three short tunnels and passing over one large viaduct, the station of Finhaut, which is the surmit of the line, 4,060 ft. above sea level, is reached. Finhaut is beautifully situated and commands a superb view of the Trient glacier and is a very popular resort of English and American tourists. Beyond Finhaut, the line approaches, in some cases very closely, the remarkable series of chasms known as the Gorges du Trient. These form a ravine seven and one-half miles long through which the Trient glacier passes. After passing through three more short tunnels, two of which are built

for protection against avalanches, the hamlet of Triquent is passed. A short distance beyond Triquent, the line crosses an enormous fissure called the Gorges du Triège, through which a torrent from the Trient glacier runs. The railway is carried over this fissure on a single span masonry bridge, 114 ft. long. The level of the track is 196 ft. above the river. Continuing past the village of Les Marécottes, the line describes a sharp curve and then descends 3,035 ft. to the little town of Salvan. This place is a favorite summer resort. From Salvan to Vernäyaz, the line descends 1,500 ft. in two miles where a rack rail is used. The line makes a spiral curve, the upper portion of which is hollowed out of the walled rock overhanging the valley. The railway reaches the Rhone valley near the entrance of the celebrated Gorges du Trient, where the rocks 420 ft. high approach each other so closely that the view at the mouth of the ravine resembles a cavern. From Vernäyaz, about 1 535 ft. above the sea, the line runs parallel for four miles with the Jura Simplon Railway to Martigny, its termination. The distance between Chatelard



Sainte Marie Bridge; Chamonix-Martigny Electric Railway.

and Martigny is 11.9 miles, the total length of the line from Chamonix being 22 miles. The maximum grade on those sections of the line using a rack is about 20 per cent., while it is about 7 per cent. where the third rail is used. Electric power for the line between Chamonix and Chatelard is generated at Servoz by three 20,000-h.p. dynamos driven by water turbines, using power from the River Arve. The river is diverted into a tunnel in the side of the hill near Port St. Marie, and this tunnel divides into three immense tubes near Servoz. The generating station for the Swiss line is situated near Salvan, the power being gotten from the Salanfe falls of the Cascade du Dalley. Both electric locomotives and auto-cars are used over this line. The locomotives weigh about 20 tons and the auto-cars about 35 tons. The latter are 55 ft. long and designed to accommodate 100 passengers. The trip from Martigny to Chatelard takes one hour and fifty-five minutes and between Chamonix and Argentiere about thirty minutes.

THE RAILWAY, THE MAN, AND THE ACCIDENT.*

BY J. O. FAGAN.

We find ourselves face to face with a very peculiar situation. On the railway we have good men,, good managers and unsatisfactory results. * * * You cannot localize accidents; it makes no difference, according to our statistics, whether the man who disobeys the rule is a greenhorn or a veteran, on duty for six hours or sixteen; whether he happens to be running fast or slow, crawling through the yards as a switcher or across the prairie as a flyer, we have illustrations to suit every condition and circumstance.

Naturally this state of affairs calls into being a great number of specialists who go to work and diagnose the symptoms. Nostrums by the score are volleyed at every tissue of the railway man's anatomy that is open to moral, medicinal or surgical treatment. In all the history of man's sojourn on this planet, it is doubtful if any section of our fellow creatures has ever before been subjected to such comprehensive and analytical scrutiny. Examine his eyes, his ears, his diet, his liver, his alcholic affinity, his domestic troubles, his mentality and psychological subdivisions, his capacity for prolonged attention under the circumstances, not to mention the discipline he is subjected to and all the different theories and methods of management. I must not be misunderstood—there is more or less importance to be attached to every one of these considerations. They are all spokes of a wheel with the man himself and his complete personality as the hub and heart of it all. I recognize the fact that external authority, that is, the absolute dictum of a railway manager has its places and uses. Nevertheless, it is manifest to me that in the nature and increasing complication of a railway man's duties, for the most part beyond the reach of supervision, this external authority is daily becoming less comprehensive and adequate as an absolute and sufficient means of securing efficiency of service. Both the external authority of the manager and the external relief and assistance of the railway man's well wishers in their humane and scientific efforts to find out what's the matter with him, are sadly handicapped and at times altogether inoperative from lack of co-operation along internal lines of the railway man himself.

With all sincerity then, I wish to call your attention to the fact that the whole field of physical, moral and psychological inquiry as to why that signal is unobserved and that rule is disobeyed, calls for a preliminary investigation that cannot be evaded. In a word, we must first connect the railway man with these preventable accidents *in his own mind.*

For the past ten years, every signal that has been erected, almost every piece of legislation, almost every article that has been written on the subject have had the effect of minimizing the employee's responsibility and taking away his moral attention. I am not criticizing this state of affairs—to the best of my ability I am describing conditions. I think the spirit of laws, safety devices, schedules and newspaper articles, in the main has had the tendency to ease up on the personality of the employees and to favor the idea that if possible, the impersonal management should be called upon to shoulder the lion's share of the blame. Let us look still deeper into this matter.

For the year 1907, and for many years previous we have certain statistics relating to preventable accidents. As a matter

*From a paper read before the American Anti-Accident Association.

of fact, we are not immediately concerned with the proportion of the fatalities and expense that can be definitely laid at the door of the employee. Indeed, if we could be convinced, and I think we can, that the employee is actually doing his best, according to his light and education, the fact would be comparatively insignificant. What we desire to bring out is that the trainmen and enginemen are actually and soulfully impressed with the deplorable loss of life and suffering and that they publicly and privately make known their desire and make manifest their intention, if possible, to improve the records. We desire this public spirit of the employee made so unmistakable that it will become the strongest factor conceivable in the good work of decreasing the number of those who disobey rules and disregard signals. I, for one, ask nothing more and nothing less.

But up to date the railway man has not given to you or the public any intimation that he is in need of immediate treatment. The statistics that appal you have not yet aroused him, as a class, to definite action that you can place your finger on and say, here is a public declaration, here is a private circular from a labor leader, or here is an account of a grand convention of railway men. So far as I am aware we feel no special call for consultation or agitation of any kind. We seem to think that all matters relating to preventable accidents can properly be left to take care of themselves without our personal assistance, or that of our organization. That is to say, the signal and the rule have not been brought under the influence of the employee's attention from the highest and most effective point of view.

I may be mistaken, but it does seem to me that the American people are going to look more and more every year to the individual employee instead of to the railway companies, in placing the blame for disastrous wrecks. There are many men who are conversant with the numerical strength of railway brotherhoods who are saying to themselves and to others, "You brotherhood men, with your vast aggregations of organized members, covering territory stretching from the Bay of Fundy to the Golden Gate and from Alaska to Panama, what are you doing? What have you done in the past to prevent accidents or to assure us that the safety of the loved ones we entrust to you has had and will have the vigilant care and attention that the unity of brotherhoods can give, if it will?"

We railway brotherhood men owe the people the payment of the moral obligation of doing everything in our power to lessen the dangers incident to travel, and I would suggest as one way to assist in achieving better results that brotherhood men request their representatives to take up before the executive meetings of their organizations the desirability of embodying in the procedure of business of the subordinate lodges an allotment of time for a discussion on the question of safety. By this means members would grow to realize that their organizations, in addition to trying to promote their welfare, would assist in using all means in their power to safeguard their lives and limbs.

The "abuse" of the power of the railway brotherhoods in their relation to safety, or rather their interference with the disciplinary measures of railway managements, has a very direct bearing on the question of the safe and expeditious handling of traffic. This abuse owes its origin to a deep sympathy for a brotherhood man in trouble; also to an inconsistent view as to what constitutes justice between officials and employees, and last, but not least, to the feeling among brotherhood men that it is their duty as such to secure a reversal of the decision given a brother, even though there be but the remotest possibility of securing it on account of the knowledge they may have that the original sentence was a just one.

The result is that certain classes of employees are careless in their observance of the rules and regulations, in accordance with the attitude of their organization in fighting for disciplined members, and this necessarily touches cogently upon safety. Officers are well aware, and brotherhood men well know, that these conditions exist, and that they vary, too, according to the conservative methods employed by the different organizations—but we all know that they do exist to a greater or lesser extent in all of them. And yet brotherhood men, through a mistaken sense of loyalty or fealty to their order, refuse to admit, except to other members, that such things are done. I believe that it is a very serious abuse of power and one that does not advance the interests of organized labor on railways, and which also has the grave tendency of blocking the proper enforcement of disciplinary measures, which, after all is said and done, means a certain measure of protection for these self same brotherhood men.

Most of us look with astonishment and envy at the accident records of European railways. From various quarters come statistics and information in regard to peculiarities in roadbed, to density of traffic and to the general conditions under which trains are moved, from all which we are called upon to bunch together and frame our excuses for accidents as best we can. It is all to no purpose. If people will only take the the trouble to study the actual accidents and the way they take place, they will quickly discover that very few accidents are common to both American and European railways. The American accident is a characteristic of personal behavior which, as an actual fact, has no counterpart in any other country. The compass and trend of American progress points to these accidents as the natural outcome of individual freedom of thought and action running riot. This is no ill considered statement. For a number of years there has been a wild scramble in almost every line of industrial behavior to kick over the traces. In many directions the results have been surprisingly beneficial, but on the railways it has been a dangerous experiment. "Taking chances" is distinctly an American characteristic. You will search in vain on European railways for accidents of a similar nature. The European railway man is too stolid, too stupid, if you prefer the term, at any rate, he is too methodical to get caught in that way. He has been too long accustomed to the rut of obedience. And I think it is an easy matter to demonstrate that the difference between American and European records is to be found in these accidents that are distressingly typical of the American temperament. It is then, the personal equation that is responsible for the avoidable accident, consequently you must look to the personal equation for your remedy. On the railway to-day, the Kicker is King. We kick against discipline, we kick against merit and ability as factors in promotion, we kick against what is, what is not and what is likely to be. Meanwhile the manager is in a whirl, dodging the sparks.

But there is one feature of our occupation and duties that has escaped our attention. We don't kick against the accident record!

The railway toll alone for twenty years has been more than 1,000,000 American fathers, wives and children. What are we, the railway men, going to do about it? First and foremost it is our problem. Far be it from me to criticize the American railway man so far as his intentions and honesty of purpose are concerned, but we must agree that certain deplorable accidents have happened and are happening only too frequently. A certain minority of railway men are accountable in some way or other for the fatalities that have occurred. Now the only power in the United States to-day that is able peacefully, radically and permanently to reach and influence this minority responsible for these preventible accidents is the railway man's labor organization. To saddle the management with the problem of anything but the arithmetic of railroading is, under present conditions, out of the question. The center of influence upon the personality of the men has passed into the hands of the union. Now let them go to work and use this influence in the public interest.

General News Section.

The Cleveland, Cincinnati, Chicago & St. Louis is preparing to introduce telephones for train despatching on its line between Cincinnati and Indianapolis.

The preparations for using electric locomotives through the Cascade tunnel of the Great Northern are now so far advanced that it is expected to begin electric operation May 20.

The Interborough Rapid Transit ran a test train of side-door cars of its own design in the subway, New York, on April 20. The doors are in the centers of the cars. Cars with side doors near each end, designed by Bion J. Arnold, were recently tried.

A press despatch from the City of Mexico says that the Wells-Fargo Express Co., instead of having a monopoly of the express business on the National Lines of Mexico, will become a minority stockholder in a new company which is to be organized, the Mexican government holding the majority of the stock. Wells-Fargo officers will manage the new company.

The State Railroad Commission of Indiana has recommended to all the steam and electric railways of the state that bulletins be put up at suitable points, warning trespassers to keep off the tracks and property of the railway. The roads are also advised to secure the co-operation of prosecuting attorneys, with a view to punishing all violations of the statutes forbidding trespassing on railways.

Several railways in Nebraska have notified the State Railroad Commission that they will discontinue the use of public drinking cups on trains. The Nebraska state board of health held that the drinking cup on trains was a menace to the public health, and the State Railroad Commission indicated that unless the roads voluntarily abolished it the Commission would issue an order requiring it.

The railway men in Seattle have pledged $10,000 for the celebration of Railway Men's Day at the Alaska-Yukon-Pacific Exposition at Seattle. A parade will be given which will be headed by such primitive means of transportation as camels, elephants and dogs, and will include an ox team and a stage coach, followed by a construction gang building a railway, and finally by a huge papier mache standard railway train.

The Pueblo Joint Inspection Association has been enlarged so that hereafter the Chief Joint Inspector and his assistant inspectors will not only inspect cars under the M. C. B. rules but will also make interchange reports to the transportation departments of the various roads. The inspectors will be paid $5 a month more than in the past, and the yard clerks who have been engaged in reporting cars interchanged will be transferred to other work.

Reports filed with the Texas state tax board show that in 1907 there were operating in that state 68 railways with a mileage of 12,053 miles, and that they paid in state, county, municipal, school district, franchise and other taxes, an aggregate of $2,707,700, or an average of $225 per mile; and that in 1908 seventy-one railways operating in the state with a total mileage of 12,968 miles, paid in state, county, municipal, school district, franchise and other taxes, an aggregate of $2,524,811, or an average of $195 per mile.

The State Railroad Commission of Indiana has issued to the railways of the state a circular calling attention to the use of inadequate and objectionable signal lamps and switch lamps, complaint having been made to the commission to this effect. The companies are called upon to detect promptly and correct failures of lamps; also to see if there are any white lights in or around the stations which interfere with enginemen's views of the signal lights. Attention is called also to the necessity of having switchstands, when situated near together, made of different heights, so as to avoid confusion at night.

The Missouri Southern Railroad will inaugurate train service on its extension from Reynolds, Mo., to Bunker on May 2. This extension opens a territory rich in timber and mineral resources and with great agricultural possibilities. A modern sawmill and woodworking plant with a capacity of 100,000 ft. of lumber daily has just been finished at Bunker, Mo., the western terminus of the extension, and the total capacity of the mills now operating on the Missouri Southern is 650,000 ft. of forest products daily. More mills are being located. The extension from Reynolds to Bunker is 10 miles long, making the entire length of the road 54 miles.

The Wabash, the Cleveland, Cincinnati, Chicago & St. Louis, the New York, Chicago & St. Louis, the Illinois Central, the Indianapolis Union Railway and other roads in Indiana are seeking to get the state board of tax commissioners to reduce the assessments of their properties below what they were made last year. Joseph Moses, who appeared for the Big Four, stated that on the night of April 19 its car accountant reported that 5,103 cars were standing idle on the sidings of that road. F. B. Carpenter, who appeared for the Nickel Plate, stated that on March 31 it had 3,600 idle cars. Similar facts were presented on behalf of other roads, and it was contended that owing to the fact that they were handling so much less business than in previous years they should not be taxed as heavily.

The New York Legislature has passed the Travis-Lee resolution providing for a constitutional amendment eliminating self-sustaining subway and dock bonds of first class cities and water bonds of third class cities from the computation of the debt limit. This constitutional amendment, which has now been approved by the Legislature for two successive years, will come before the people of the state for a vote next fall, and if adopted will permit New York City to expend a large sum for new subways; such expenditures being at present impossible because by limitation in the state constitution the city has already borrowed nearly all the money that it can. Should the constitutional amendment be adopted the amount of dock bonds which would be eliminated from the sum total of the city's debt, as stated in making computations in connection with the debt-limit, would be $95,870,000 and of rapid transit bonds $54,863,325, making a total of $150,733,325.

Interborough's Traffic.

In connection with the wide publicity New York City's transit needs are obtaining these days through advertisements in New York papers a statement of the number of passengers being carried by the Interborough is of pertinent interest.

In the month of March last the Interborough carried a total of 43,994,740 passengers, which is 4,133,161 more than it had in March, 1908. Travel was divided as below:

	March		
	1909.	1908.	Increase
Elevated lines	24,073,561	23,335,694	737,867
Subway	19,921,179	16,525,885	3,395,294
Total	43,995,740	39,861,579	4,133,161

It will be seen that while the elevated lines are still carrying more than half of the daily passengers on the system, the increasing popularity of the subway is causing that branch to overhaul the elevated. Where a year ago 59 per cent. of the travel was over the latter named lines, and 41 per cent. in the subway, the figures in March were 54 per cent. and 46 per cent. respectively. On a daily average, Sundays included, the elevated carried about 777,000 passengers in March of this year to 643,000 carried by the subway. The number carried Sundays is but little more than half the week day average.

April 12, 1909, was the biggest day in the subway's history, when in connection with the crowds which attended the Petrosino funeral there were carried 893,000 passengers in that single day.—*Wall Street Journal.*

Austrian Roads.

Austria has completed an electrical survey of the streams of the Alps with a view to their utilization for railway motive power and for general industry.

Steel Corporation Earnings.

The statement of earnings of the United States Steel Corporation and subsidiary companies for the quarter ending March 31, 1909, is as follows:

January, 1909	$7,262,605	
February, 1909	7,669,336	
March, 1909	7,989,327	
Total earnings after deducting all expenses incident to operation.*		$22,921,268
Less, charges and appropriations for:		
Sinking funds on bonds of subsidiary companies	$272,533	
Depreciation and reserve funds	3,463,666	
		3,736,199
Net earnings		$19,185,069
Interest for quarter on U. S. Steel Corporation bonds outstanding	$5,939,208	
Sinking funds for the quarter on U. S. Steel Corporation bonds, viz.:		
Installments	$1,012,500	
Interest, bonds in sinking funds	360.255	
	$1,372,755	
		7,311,963
Balance		$11,873,106
Dividends for quarter, stocks U. S. Steel Corporation, viz.:		
Preferred, 1¾ per cent.	$6,304,919	
Common, ½ per cent	2,541,513	
		8,846,432
Surplus for the quarter		$3,026,674

*Including those for ordinary repairs and maintenance of plants and interest on bonds and fixed charges of the subsidiary companies.

In the preceding quarter the total earnings were $26,225,485 and the surplus was $5,142,451. The unfilled orders on hand on March 31, 1909, amounted to 3,542,595 tons, which compares with 3,603,527 tons on December 31, 1908, and 3,765,743 tons on March 31, 1908.

Burlington Association of Operating Officers.

The forty-first meeting of the Burlington Association of Operating Officers was held at the Auditorium Hotel, Chicago, on April 20, 21 and 22. On the evening of April 21 a dinner was given, at which Daniel Willard, Second Vice-President, was toastmaster. The speakers and their subjects were: "Passenger Service," John Francis, General Passenger Agent; "Claims," C. I. Sturgis, General Auditor; "Co-operation," A. D. Parker, Vice-President of the Colorado & Southern. O. M. Spencer, General Solicitor of the Missouri district of the Burlington, closed the speaking with reminiscences of the early building of the Burlington. James J. Hill was to have been the guest of honor but was unable to attend.

Oppose Further Railway Legislation in Illinois.

A large delegation, composed of representatives of the manufacturers of railway supplies having plants in Illinois, appeared at Springfield on April 29, before the various committees of the Illinois legislature to which railway bills have been referred, to oppose any further railway legislation at the present session of that body. The delegation was headed by George A. Post, President of the Railway Business Association, and A. H. Mulliken, one of the Vice-Presidents of the association. Mr. Mulliken made a short address introducing Mr. Post, who made the principal argument.

A special train was run from Chicago to Springfield Wednesday night and from Springfield to Chicago on Thursday night as a second section of the Chicago & Alton's Midnight Flyer, carrying the members of the association who went to Springfield from Chicago. A large number of supply manufacturers from East St. Louis and other points in the state joined the party from Chicago at Springfield.

Pants Pressed for Plebeians.

The New York Central announces that henceforth there will be "valets" not only on the limited trains whose passengers are supposed to set a high value on their time—and their appearance as well—but also on trains Nos. 29 and 30, the Buffalo Special, running nightly between New York and Buffalo.

Thus what were but yesterday luxuries for the rich are rapidly becoming the necessities of ordinary people, and, by a very slight stretch of the imagination, one can see all the legislature's next year members presenting "full-crew law bills," applying to all trains, suburban, branch line, mixed trains, and everything, requiring every train crew to consist of

Conductor.	Porters.
Engineman.	Barber.
Monitor.	Valet.
Brakemen (in number according to the feelings of "labor" at the time).	Maid.
	Manicure.
	Stenographer.
Flagman.	Typewriting operator.
Fireman.	Dining car conductor.
Assistant fireman.	Custodian of the wine cellar.
Baggagemaster.	Cook.
Electrician	Assistant cook.
Parlor car conductor.	Dish washers.
Sleeping car conductor.	Waiters.

South Manchurian Railway.

According to a consular report, the South Manchurian Railway, which last year could bring down only about 2,000 tons a day to Newchwang and Dalny, can now deliver daily at the two ports 3,500 tons. Last year also there were repeated washouts during the summer, which completely interrupted traffic for weeks at a time. This year, though there was some trouble, no such obstruction was caused. There is now arriving at Dalny by train an average of 3,000 tons of freight every day, as compared with about 1,500 last year.

Antung-Mukden Railway.

The reconstruction of the Antung-Mukden Railway is to be started in earnest early this spring. Permanent survey work was begun in January from the Antung end of line and three of the most important tunnels have already been located and all preliminary drafting completed. The route adopted by the engineers will not vary much from the present line, except that the terminus will be moved southward across the Hun river to Suchiatun, on the main line of the South Manchurian Railway, some 10 miles from Mukden. By thus changing the terminus from Mukden to Suchiatun the necessity for bridging the Hun river will be obviated and the line shortened a few miles. Suchiatun is already the junction of the branch line to the Fushun collieries, having the necessary yards and transshipping facilities. There will, therefore, be a considerable saving to the company by adopting Suchiatun as the terminus of the Antung line. It is said that the new route, i.e., from Antung to Suchiatun, will be 20 miles shorter than the present Antung-Mukden line. It is estimated by the Japanese that it will require three years to complete the work of reconstruction and that the average cost per mile will be about $50,000.

International Railway General Foremen's Association.

As previously announced in the *Railroad Age Gazette*, the annual meeting of the International Railway General Foremen's Association will be held at the Lexington Hotel, Chicago, June 1 to 5, inclusive. There will be two sessions daily, beginning at 9 a.m. and at 2 p.m. Topical discussions will be made the special order of business the last 45 minutes of the morning session each day. The meeting will adjourn at 2.30 p.m. on June 2 to give the members a chance to visit the railway appliances exhibit on the parlor rotunda floor of the Lexington Hotel.

Committees will report on the following subjects: "Air-Brake Equipment, All Classes of Service"; "Coaling of Engines with Mechanical Devices"; "How to Obtain the Greatest Despatch in Handling Engines Through Terminals"; "Installation of Hot Water Washout and Filling System"; "Best Method of Getting Work Through Shop with Economy and Despatch"; "Most Approved Type of Ash Pan Conforming with Requirements of Interstate Commerce Commission."

There will be the following topical discussions:

"Best Method of Arriving at Cost of Repairs," introduced by W. S. Cozad (Erie), followed by H. D. Kelly (C. & N. W.).

"What Class of Repairs Should be Made at Outside Points Where Facilities Are Limited," introduced by F. W. Rhuark (B. & O.), followed by S. B. Clay (St. L. & S. F.).

"The Use of Commercial Gas for Heating Purposes in Modern Shop Plants in Place of Gasolene or Crude Oil," introduced by J. N. Davis (C. & S.), followed by T. L. Drew (B. & O.).

"The Use of Oxy-Acetylene Process for Welding Fireboxes, Boiler Sheets, Frames and Other Locomotive Work."

"What Advantage from the Use of the Wide Firebox? Should the Wide Firebox Have a Wide or Narrow Water Leg?" introduced by Lee R. Laizure (Erie), followed by P. F. Flavin, Vice-President, International Railway Boilermakers' Association.

"The Location of the Point of Water Delivery in the Boiler; Why Not at a Point Six to Eight Inches Above the Mud Ring Just in the Rear of the Throat Sheet?" introduced by H. W. Kidneigh (Santa Fe), followed by H. J. Carrier (Erie).

The headquarters and general arrangements for the convention will be in charge of the executive committee of the Railway Supply Men, which is composed of Frank Raymond Spear (Chairman), Frank Baskerfield, Charles P. Storrs, Clifford A. Nathan and J. Will Johnson, Secretary and Treasurer. James C. Younglove is Chairman of the committee on entertainment. The hotel rates will be as follows: Rooms without bath, $1 to $2 per day single; $2 to $3 per day double. Outside rooms with bath, $2 to $3 per day single; $3 to $4 per day double. Table d'hote luncheon, 50 cents.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; May 11-14, 1909; Richmond, Va.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; May 11; St. Louis, Mo.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., New York; second Friday in month; New York.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York, May 19, 1909; New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.; Oct. 19, 1909; Jacksonville, Fla.

AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.

AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—R. E. Wilson, Ry. Exchange, Chicago; May 11; Cincinnati, Ohio.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 16-18, 1909; Atlantic City.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St.; N. Y.; 1st and 3d Wed., except July and August; New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; annual, Dec. 7-10; New York.

AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.; last week in May, 1909; Detroit, Mich.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago, June 23-25, 1909; Detroit.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Pl., New York; June 22-23; Montreal.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R.R., Richmond, Va.; June 16, 1909; Old Point Comfort, Va.

INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., N. Y.; April 27-30, 1909; Louisville, Ky.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago, June 21-23, 1909; Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—E. C. Cook, Royal Insurance Bldg., Chicago; June 1-5; Chicago.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 21-23, 1909; Atlantic City.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug., and Sept.; Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.

NORTH-WEST RAILWAY CLUB.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, Aug.; St. Paul and Minn.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.; June 8, New York.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C., Collinwood, Ohio; May 17-19; Chicago.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Nov., 1909; Washington.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June July, and Aug.; St. Louis.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.

SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R, East Buffalo, N. Y.; September, 1909; Denver.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St., Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago, 1st Wednesday, except July and August; Chicago.

Traffic News.

The Union Pacific and allied lines have made formal applications to the Interstate Commerce Commission at Washington for a suspension of the commission's order in the Spokane rate case. The order as issued was to take effect May 1.

It is reported that the Canadian Pacific Despatch has decided to raise westbound freight rates. This is interpreted as a move toward the establishment of peace with the trunk lines which have been combating the Canadian Pacific and the New Haven on the matter of their differential out of New York.

The Union Stock Yards at St. Paul during the first three months of the current year received 6,207 cars of live stock, compared with 7,229 cars last year, or a decrease of 1,002 cars. In March alone 2,161 cars arrived, against 2,419 cars in March, 1908. Three months of shipment give gains from 2,125 cars in 1908 to 2,378 cars this year.

The Delaware, Lackawanna & Western announced last week its intention to reduce by two cents per 100 lbs. the freight rates on sugar in carloads from New York City to western points. The Pennsylvania, the Philadelphia & Reading and the Baltimore & Ohio at once followed with announcements that they would make a similar reduction from Philadelphia, thus maintaining the differential in favor of that city. With these reductions, the rate to Chicago will be from New York 26 and from Philadelphia 24 cents.

Wells, Fargo & Co. announce that on May 1 they will extend their express service over about 10,000 additional miles of railway line and will open about 1,200 more offices. They will then operate over 70,000 miles of railway. The roads on which this company's service will be installed on May 1 include all lines of the St. Louis & San Francisco, all lines of the Chicago, Milwaukee & St. Paul, and the following new electric lines: The Chicago, Lake Shore & South Bend, the Rock Island Southern, the People's Traction Company and the Tama & Toledo. Wells, Fargo & Co. also established their service on the Chicago, Peoria & St. Louis on April 1.

The two Utah members of the United States Senate have presented to President Taft a petition for redress against the Union Pacific and also, in a lesser degree, against the Denver & Rio Grande and other roads, in the matter of freight rates to and from Ogden, Salt Lake and Provo, which it is declared are grossly discriminative and oppressive. It is alleged that the roads have unlawfully conspired together to exact much higher charges from the East than from the East to California, and that similar discrimination is in vogue in rates to and from other points. By unlawful conspiracy the roads have steadily increased the rates on freight, and have made oppressive regulations.

Both the railways and the coal operators in Missouri are filing protests with the State Railroad Commission against the mileage rates on coal which it proposes to put into effect on May 1. It is contended that the proposed rates would enable coal producers in Illinois to ship coal to points in Missouri for less than it could be hauled to those points from Missouri mines. The Commission about a year ago proposed to apply a mileage tariff on coal, but then also the railways and the coal operators united in opposing the enforcement of the order and it was withdrawn. The Commission has postponed until May 15 the date on which the proposed rates shall be put into effect.

Testimony was taken by a Special Master in Chicago last week in the case brought in the Federal court at St. Paul by the transcontinental lines to restrain the Interstate Commerce Commission from enforcing its order requiring the railways to reduce the rates on lumber from the Northwest which they put into effect on November 1, 1907. J. A. Munroe, Freight Traffic Manager of the Union Pacific, said that the increase in 1907 was made because of increases in the cost of transportation. It was believed that higher rates would not hinder the movement of lumber and that this commodity should contribute in larger proportion to paying the expenses of operation. He admitted the advances were made after conferences between the traffic officers of the interested lines.

He thought that the rates had long been too low in proportion to what was charged on other traffic. Asked if he believed that the railways should share in the increased profits received by lumbermen owing to the advances in the price of lumber, Mr. Munroe replied that he believed the roads were entitled to share in the increased prosperity of the country. He did not think it was fair that when lumber prices were constantly going up the railways should be held rigidly to the old rates. If lumber prices were going down he thought that the railways should correspondingly reduce their rates. J. G. Woodworth, Traffic Manager of the Northern Pacific, gave testimony similar to that of Mr. Munroe. He reviewed the history of lumber rates in the Northwest, and contended that they had been too low in proportion to the rates on other traffic. He conceded that the gross earnings, traffic density and ton-mile revenue of the Northern Pacific had increased largely during the past ten years, and that it has been getting a fair return on its investment, but contended that, nevertheless, it has not been getting a fair return from its lumber traffic.

On Saturday last the Cincinnati, New Orleans & Texas Pacific entertained the members of the National Association of Freight and Traffic Agents on an excursion from Cincinnati to Chattanooga, showing them the scenery and industries at the different points along the line of the road, and giving the party excursions from Chattanooga to Lookout mountain and Chicamauga park. About 150 guests enjoyed the excursion. The party consisted mostly of city, local and traveling agents and their wives, sons and daughters. The members of this association are mostly northern men, and the Queen & Crescent gave the entertainment with a view to making them more familiar with the business world of the South, where new industries are constantly springing up.

INTERSTATE COMMERCE COMMISSION.

Commissioner Prouty on April 21 at Chicago directed the express companies doing business in the Middle West to comply with the petition of the Fairmount Creamery Co. and other large creamery concerns for reductions in the rates on creamery products. The Commission in its decision in the case of Beatrice Creamery Co. et al. v. Illinois Central et al. and other proceedings brought by the so-called creamery trust to restrain the railways from collecting advances that they had made in rates to Chicago and other concentrating points, held that the advances made by the railways were unreasonable and fixed certain schedules of rates to be charged. Mr. Prouty suggested that the express companies put into effect through rates over connecting roads similar to those the Commission had ordered the railways to make. He indicated that unless the express companies acted upon this suggestion the Commission would issue a formal order in the case.

Loading Charges and Carload Rates.

John N. Voorhees v. Atlantic Coast Line et al. Opinion by Commissioner Clements.

Complainant shipped 6 carloads of cabbages from St. Andrews, S. C., to New York, N. Y., for the transportation of which defendants charged their less than carload rate, because the initial carrier performed the loading service. These shipments having been offered in carload quantities were entitled to the published carload rate, and in the absence of specific tariff provision no additional charge could be lawfully collected from complainant to cover loading service performed by the railway company. Reparation awarded.

Routing by the Shipper.

Duluth Log Company v. Minnesota & International et al. Opinion by Commissioner Lane.

Complainant alleges that its shipment of poles over lines of defendants from La Porte, Minn., to Poplar Bluff, Mo., should not have moved through Kansas City, but it appeared that a representative of complainant directed that it be carried by the Frisco line, which necessitated its going through Kansas City. It was the duty of the initial carrier to obey the specific routing instructions furnished by complainant. When a shipper names the carriers that are to transport his shipment, it must be assumed that he is relying on his own investigations, and that for some reason he considers it expedient that the shipment move over the route indicated by him.

However, the record shows that while defendants transported the shipment over the lines named by complainant, they did not route or carry it via the cheapest reasonable route available over the lines of the carriers specified in the shipping bill. If the shipment had moved from Kansas City to Poplar Bluff through Springfield, Mo., rather than through St. Louis a lower rate than the one collected would have been available. It is therefore held that complainant was entitled to the lowest rate available via the Frisco Line and that damages should be awarded against the defendant for such misrouting.

Published Rate Not Necessarily Legal.

Arkansas Fuel Company v. Chicago, Milwaukee & St. Paul. Opinion by Commissioner Harlan.

The act to regulate commerce as amended not only gives a remedy against excessive and unreasonable rates as applied to shipments to be made in the future, but also affords the shipper a means of recovering excessive charges on shipments made by him in the past under rates that were unjust and unreasonable. In dealing with shippers the carrier is required to conform the freight charges actually collected to the amount fixed in its published tariffs, and in that sense the published rate in effect at the time of the movement is the legal rate; but the law declares that every charge for services rendered by a carrier in the transportation of passengers or property shall be reasonable and just, and if a carrier promulgates a rate in violation of this injunction it is not a lawful rate when its reasonableness is subsequently questioned upon complaint filed. While the published rate is the legal rate, the mere publication cannot make a rate lawful that is unreasonable and excessive. No rate can be lawful, in the sense of being immune from attack, either with respect to past or future shipments, if it be excessive and unreasonable in amount.

Complainant shipped from Kansas City, Mo., to Seymour, Iowa, via defendant's road, a carload of hay on which it was compelled to pay a class rate of 13½ cents per 100 lbs. This was 1 cent higher than a proportional commodity rate which had been in effect between the points in question until a short time prior to the date of the shipment and was restored within about 60 days thereafter by an amendment to defendant's tariffs. Under the admission of the defendant, and on the Commission's knowledge of hay rates in the same territory, the class rate was excessive and unreasonable, and should not have exceeded the commodity rate. Reparation awarded on that basis.

Track Storage Charges at Pittsburgh.

Wilson Produce Co. et al. v. the Pennsylvania. F. Wilbert Bros. et al. v. same. H. W. Joynes v. same. Opinion by Commissioner Lane.

Defendant's track-storage tariff, applying to carload shipments of fruit and produce received at the Pennsylvania lines produce yards at Pittsburgh, Pa., provides that after the expiration of 48 hours' free time, track-storage charges will be assessed as follows: For the first two days, $1 per car per day or fraction thereof; for the next succeeding two days, $3 per car per day or fraction thereof, and for each succeeding day $4 per car per day or fraction thereof. On rehearing of complaint challenging legality of these charges, it is held that the law does not require a carrier to give its cars and tracks under any terms for use as warehouses or places of business.

After allowing a reasonable time for unloading cars, a carrier may impose such charges for further detention as will lead to the speedy release of its equipment. A carrier has a right to impose such charges at its produce terminal as will render that terminal available for the purpose for which it was intended. The imposition of higher track-storage charges at the Pennsylvania lines produce yards in Pittsburgh than at other points does not constitute undue discrimination in view of the substantial dissimilarity of conditions. Complaint dismissed.

Discrimination Against Indianapolis.

Indianapolis Freight Bureau v. Cleveland, Cincinnati, Chicago & St. Louis et al. Opinion by Commissioner Clark.

Complainant alleges the exaction by defendants of unjust and unreasonable class rates from Indianapolis, Ind., to Missouri river points in and of themselves and as compared with rates on similar traffic from Chicago; also challenges defendants' rates on chairs and furniture from Indianapolis to Missouri river points. The present class rates on through traffic from Indianapolis to Missouri river points are unreasonable and subject Indianapolis to unreasonable prejudice and give to Chicago undue preference. A relative adjustment as between Indianapolis and Chicago is prescribed; also reasonable maximum rates to be applied in the future to the transportation of class-rate traffic and chairs and furniture from Indianapolis to Missouri river points. Order relative to class rates and relative adjustment thereof withheld pending court decision on *Burnham, Hanna, Munger case*, 14 I. C. C. Rep., 209.

While it may not be doubted that competitive conditions are responsible for the present rates applying from Chicago, yet, giving full weight to such considerations, it is the province of the Commission to determine whether the disparities between the total charges from Chicago and Indianapolis, respectively, are greater than are justified by the recognized dissimilarity of conditions.

Whatever may be the general effect of an order changing the rate structure for a typical point in a group, the Commission cannot, under the law, deny relief to such point for the sole reason that other points in like situation may be able to show that they are entitled to a similar order. Any order which the Commission may have authority to enter must be predicated on the complaint which is before it, after examination into the facts, circumstances, and conditions appertaining thereto, and such order is limited in its scope by the petition filed in the particular case to which it is addressed. If other points in the same territory are properly entitled to relief by order of the Commission, proceedings specifically directed to that end must be prosecuted in the manner prescribed by law to vest the Commission with authority. Whether or not such other points are entitled to similar relief depends upon the facts, circumstances, and conditions appearing upon investigation, and those questions cannot be determined in this case.

STATE COMMISSIONS.

The Railroad Commission of Louisiana has rescinded the reciprocal demurrage rule which it made in an order issued on March 19, 1907, because it has found that it has not power to enforce it.

The Montana Railroad Commission has held that the rates on hay and straw in that state are excessive where the distances are more than 45 miles, and has fixed a new maximum distance tariff ranging from 3 cents to 34 cents per 100 lbs. for distances from 10 to 690 miles.

The Colorado Railroad Commission has ordered the Colorado & Southern to reduce its rate on coal from Denver to Central City from $3.20 a ton to $1.75 a ton. The order was made as a result of a petition filed by the Jenkins-McKay Hardware Company, which alleged that a rate of $3.20 a ton, the distance being 38 miles, was excessive. The road did not oppose the reduction.

The Railroad Commission of Louisiana has issued a new rule governing the receiving and delivering of baggage at stations in Louisiana where there are agents. This requires railways to deliver baggage during the hours in which agents are on duty except during 30 minutes before the arrival of trains. When trains arrive at night baggage must be delivered immediately after their arrival and for 15 minutes thereafter. Baggage to be forwarded must be received at any hour during the day that passengers are taking trains when the agent is on duty. When trains leave before 8 a.m. baggage to be forwarded must be received on the afternoon of the day previous.

The New York Public Service Commission, First district, has issued orders to all the street railways in New York to equip all their cars, except those operated by animal power, with wheel guards or fenders of a type to be approved by the commission. In every case drawings and specifications for the equipment are to be submitted to the commission for approval. In the year ended December 31, 1908, the total number of injuries on the lines under consideration was 35,050, which included 2,137 seriously injured and 434 killed outright. It is calculated that it will cost between $200,000 and $250,000 to equip the 6,000 cars in use in the five boroughs. The total cost of law suits and legal expenses arising from injuries has been $3,500,000.

COURT NEWS.

In the United States Circuit Court of Appeals at Richmond, Va., April 20, on petition of the Cabin Creek Consolidated Coal Co. of West Virginia, Judge Goff issued an order restraining the Chesapeake & Ohio from increasing the rate on coal from the New River and Kanawha districts of West Virginia to Lake Erie ports. It is charged in the bill that the coal operators in eastern Ohio and western Pennsylvania are attempting by forcing the rates from the Kanawha and New River districts to lake ports beyond the hope of competition to establish a monopoly in lake coal traffic.

Judge John F. Philips of the federal court at Kansas City issued a temporary injunction on April 24, restraining the Attorney General of Missouri, the members of the Railroad Commission, the Circuit Attorney at St. Louis and other state officers, from interfering with the railways of that state in any action that they may make to restore passenger rates to a basis of 3 cents a mile. The injunction is returnable on May 6. Judge Philips specifically forbade the state officials to prosecute in the state circuit court at St. Louis the suit brought by Circuit Attorney Jones to restrain the railways from raising their rates to 3 cents a mile. Governor Hadley of Missouri subsequently issued a statement saying that the state's suit in the state court at St. Louis would be dismissed so far as it affects roads that adopted a 2½-cent fare. He indicated that the state would appeal to the supreme court of the United States against any road that sought to charge a 3-cent fare.

Judge De Haven of the federal court at San Francisco on April 22, rendered an opinion holding that ocean carriers operating between the United States and foreign countries are not subject to the provisions of the Interstate Commerce Commission against rebating, but that a railway which is a party to a through rate between a point in a foreign country and a point in the United States which does not conform to the law may be punished. The Pacific Mail Steamship Company and the Southern Pacific accepted a shipment of matting on a joint through rate from Kobe, Japan, to Springfield, Ohio. A competing Japanese steamship line offered a reduced rate on the matting just before the Pacific Mail steamship sailed for Japan, and the P. M. S. met the reduced rate, the result being that the shipment was transported at a rate less than the legal quotation. Judge De Haven said that the steamship company could do as it saw fit in charging rates, but that when a joint legal rate to which a railway was a party was departed from, the railway became liable for violation of the law.

The United States Circuit Court of Appeals for the Seventh Judicial Circuit, Judges Grosscup, Baker and Kohlsaat, has dismissed the petition of the Chicago, Milwaukee & St. Paul for an injunction to restrain the Interstate Commerce Commission from keeping in effect its order requiring this road to apply for two years a rate that it had voluntarily reduced. The Flint & Walling Manufacturing Company complained to the Interstate Commerce Commission that the Lake Shore and other roads, including the Chicago, Milwaukee & St. Paul, charged a joint through rate of 28 cents per 100 lbs. on water tanks and substructures from Kendallville, Ind., to Beaver Dam, Wis., via Milwaukee, when the sum of the local rates was only 21½ cents. After the petition was filed with the Commission the defendant roads voluntarily reduced the through rate to the sum of the locals. The Commission awarded reparation and, as already stated, ordered the car-

riers to keep the reduced rate in force for two years. The St. Paul in its petition challenged the right of the Commission to require it to keep a new rate in effect two years, which rate had been made voluntarily. The court in dismissing the railway's bill held that the Commission had authority to make such an order, inasmuch as the rate attacked was in effect at the time of the filing of the shipper's petition; that the jurisdiction of the Commission to determine the reasonableness of the rate took effect when the shipper's petition was filed; and that no subsequent act of the defendant could oust its jurisdiction until it had passed upon the question involved.

Decision Under Hours of Labor Law.

Judge Landis, of the Federal court at Chicago, rendered an opinion on April 21 that the Atchison, Topeka & Santa Fe had violated the federal hours of labor law, and under his instructions the jury in the case returned a verdict of guilty. A fine of $100 was imposed. The case was tried on an agreed state of facts. The testimony showed that at Corwith, Ill., two telegraph operators were employed, one a day man and one a night man, the day man's time being from 6.30 a.m. to 6.30 p.m., but that he was off duty three consecutive hours of this time; and that the night man's time was from 6.30 p.m. to 6.30 a.m., but that he was off duty three consecutive hours of this time. Judge Landis admitted that Congress had not made clear the meaning of the law, but said its title indicated that it was an act to protect railway employees and passengers. Having in mind the purpose of the law as indicated by its title, he was of the opinion that it meant that an operator cannot be on duty for more than one unbroken period of nine hours, and that the period starts when he begins work and ends when he is finally dismissed for the day. He therefore instructed the jury to bring in a verdict of guilty.

Protection via the Freight Office.

The Mexican government railways have issued a tariff, which has been approved by President Diaz, in which Mexican coal is granted rates of $1 a ton less than those on imported coal. This reduction also applies to native coke. It is regarded as a prohibitive discrimination against foreign coal and coke.

Summary of Revenues and Expenses of Railways for February.

Rail operations.	Amount. 1909.	Amount. 1908.	Per mile of line 1909.	Per mile of line 1908.	Ratio, per cent. 1909.	Ratio, per cent. 1908.
Freight revenue	$93,752,124	$85,275,181	$564	$525	69.65	68.77
Passenger revenue	29,853,619	28,028,989	179	172	22.18	22.60
Other transp. rev.	9,734,374	9,467,563	58	58	7.23	7.64
Nontransp. revenue	1,261,404	1,234,328	7	7	.94	.99
Total operating rev.	134,601,522	124,006,062	811	763	100.00	100.00
Maint. way & struc.	14,972,201	13,658,179	90	84	11.12	11.02
Maint. of equipment	23,283,390	21,360,187	140	131	17.30	17.22
Traffic expenses	3,058,472	2,913,594	18	17	2.27	2.35
Transp. expenses	50,906,432	52,918,119	306	325	37.82	42.67
General expenses	3,846,189	3,759,893	23	23	2.86	3.03
Total operating exp.	96,066,687	94,609,974	578	582	71.37	76.29
Net operating rev.	38,534,835	29,396,088	232	181	28.63	23.71
Outside operations.						
Total revenues	2,636,825	1,847,729	15	11	.....	.....
Total expenses	2,771,885	1,884,520	16	11	.....	.....
Net revenue	135,060*	36,790*	..	..	.....	.....
Total net revenue	38,399,774	29,359,297	231	180	.....	.....
½ annual taxes	5,506,509	5,158,074	33	31	.....	.....
Operating income	32,893,265	24,201,222	198	149	.....	.....
No. of reports	208	204	..	..	.....	.....
Mileage operated	165,946.02	162,340.25	..	..	.....	.....

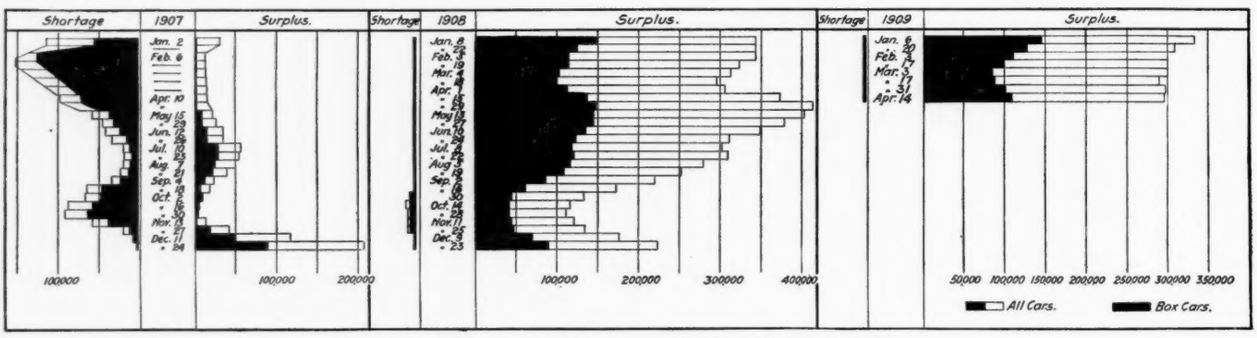
*Deficit.

Car Surpluses and Shortages.

Arthur Hale, Chairman of the Committee on Car Efficiency of the American Railway Association, in presenting bulletin No. 45, giving a summary of car surpluses and shortages by groups from February 19, 1908, to April 14, 1909, says:

"There is practically no change in the surplus car situation since our last bulletin, the total for the date of this report being 296,663, an increase of 63 cars. There is an increase of 6,947 in box, with a decrease of 5,564 in coal and gondola. There is also considerable decrease in flats, due to drafts made on this class of equipment for construction purposes and in quarry trade. The results by groups differ very little from the grand total."

The accompanying table gives the surpluses and shortages for the period covered by the report and the chart shows the surpluses and shortages in 1907, 1908 and 1909.



Car Surpluses and Shortages in 1907, 1908 and 1909.

CAR SURPLUSES AND SHORTAGES, FEBRUARY 19, 1908, TO APRIL 14, 1909, INCLUSIVE.

	Number of roads.	Surpluses. Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
April 14, 1909	163	108,291	17,692	122,982	47,698	296,663	80	135	109	19	343
March 31, 1909	158	101,344	20,428	128,546	46,282	296,600	158	98	116	27	399
March 17, 1909	161	88,459	20,328	139,997	42,634	291,418	310	74	27	139	550
February 17, 1909	159	98,512	23,924	135,208	43,797	301,441	266	97	11	96	470
February 3, 1909	165	110,632	26,121	122,711	42,107	301,571	97	31	49	111	288
January 20, 1909	162	127,204	26,723	116,680	41,057	311,664	163	21	139	35	358
January 6, 1909	156	146,255	25,383	117,686	43,695	333,019	170	202	120	14	506
December 23, 1908	158	87,350	16,247	79,595	38,885	222,077	471	42	289	217	1,019
November 25, 1908	160	45,194	12,157	43,854	31,624	132,829	7,923	178	900	209	9,210
October 28, 1908	158	39,383	10,185	31,541	29,803	110,912	8,175	167	2,261	236	10,839
September 30, 1908	160	42,593	10,365	49,795	31,039	133,792	7,313	450	224	127	8,114
August 19, 1908	160	106,367	13,494	92,500	40,642	253,003	465	90	105	194	854
July 22, 1908	166	120,580	14,401	125,739	47,960	308,680	115	37	330	27	509
June 24, 1908	163	123,112	18,042	130,149	41,995	313,298	266	34	120	31	451
May 27, 1908	160	144,697	20,075	162,695	54,437	381,904	82	13	12	18	125
April 29, 1908	159	147,971	24,350	186,742	59,542	413,605	145	42	16	64	267
March 18, 1908	160	103,509	25,122	119,205	49,206	297,042	533	151	250	73	1,007
February 19, 1908	161	113,776	30,088	134,217	44,432	322,513	697	141	249	162	1,249

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF FEBRUARY, 1909.
(See also issues of April 9, 16 and 23.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	143	$78,292	$28,061	$117,552	$22,307	$26,750	$3,681	$40,984	$5,048	$98,770	$18,782	.....	$4,450	$14,332	$7,414
Bessemer & Lake Erie	201	170,970	16,653	192,438	37,157	85,880	6,184	86,840	6,832	222,893	30,455*	.....	6,000	36,455†	6,854
Buffalo & Susquehanna	373	164,589	12,938	183,133	27,511	56,171	2,268	88,232	6,715	180,897	2,236	$63*	4,000	1,827†	8,501
Central Branch	388	99,382	21,933	130,510	13,206	19,413	3,568	52,099	3,823	92,109	38,401	.....	9,500	28,901	10,871
Central New England	294	157,786	19,989	187,624	18,188	16,918	1,236	64,971	2,554	103,867	83,757	.....	5,600	78,157	58,939
Chicago, Cincinnati & Louisville	285	87,874	16,215	109,225	12,351	22,965	8,746	53,043	5,798	102,903	6,322	.....	3,885	2,437	30,114
Chicago, Peoria & St. Louis	255	96,339	19,661	121,646	16,177	29,306	6,220	63,091	4,326	119,120	2,526	.....	4,300	1,774†	10,271
Cleveland, Akron & Columbus	210	101,665	28,511	143,020	18,429	25,608	1,930	48,078	3,019	97,064	45,956	.....	5,000	40,956	9,245
Cleveland, Lorain & Wheeling	194	141,209	15,721	162,532	30,359	34,323	6,266	73,725	6,018	150,691	11,841	.....	9,406	2,435	‡44,402
Cumberland Valley	162	139,195	36,806	187,771	18,401	18,949	3,370	60,327	4,693	105,740	82,031	101	3,713	78,419	22,074
Detroit & Mackinac	348	66,729	16,940	89,003	13,191	18,823	1,580	31,095	2,364	67,053	21,950	140*	6,850	14,960	9,667
Duluth & Iron Range	168	65,469	15,156	85,233	32,227	24,650	357	50,233	8,042	115,509	30,276*	2,414*	4,624	37,314†	16,711
Duluth, Missabe & Northern	282	71,841	26,741	101,906	40,618	55,837	1,308	58,741	10,013	166,517	64,611*	3,850*	4,646	73,107†	567
Elgin, Joliet & Eastern	239	196,130	7	200,663	18,659	35,386	2,612	70,740	6,633	134,030	66,633	.....	9,500	57,133	29,635
Evansville & Terre Haute	310	88,830	43,988	149,255	14,363	21,639	3,374	55,756	6,370	101,502	47,753	399*	9,035	38,319	‡7,206
Grand Trunk Western	336	269,937	100,725	401,203	28,538	65,623	19,503	182,720	10,323	306,707	94,495	1,438*	32,000	61,057	27,465
Kanawha & Michigan	177	103,859	20,729	128,261	23,436	38,432	2,277	52,581	2,561	119,287	8,974	31*	6,490	2,453	4,697
Louisiana Ry. & Nav. Co.	343	80,034	10,323	96,215	21,166	14,580	3,740	44,325	5,415	89,226	6,989	.....	3,750	3,239	3,014
Midland Valley	324	31,342	19,836	55,444	15,042	16,269	1,759	22,289	4,131	59,490	4,046*	.....	8,000	12,046†	‡20,509
Missouri Pacific	3,492	1,137,869	247,601	1,553,178	266,365	271,112	47,681	759,848	53,944	1,398,950	154,228	98*	77,105	77,025	‡121,198
Nevada & California	379	54,590	17,301	79,557	6,002	9,410	723	59,616	1,825	77,576	1,981	458*	6,200	4,677†	‡13,867
New Orleans & Northeastern	196	176,910	53,716	251,816	25,137	44,699	7,778	94,082	10,260	181,956	69,860	.....	8,000	61,860	38,886
New York, Susquehanna & Western	151	139,111	41,700	207,212	10,488	18,011	1,504	80,388	3,481	113,872	93,340	1,054	15,089	79,305	63,162
New York, Philadelphia & Norfolk	112	169,299	30,178	213,731	25,570	41,414	2,922	83,853	8,528	162,287	51,444	.....	6,250	45,194	11,677
Northwestern Pacific	373	58,800	84,382	162,008	37,572	31,891	2,241	74,890	9,296	155,890	6,118	.....	8,955	2,837†	30,639
Pittsburgh & Lake Erie	191	675,853	80,290	783,783	80,125	91,805	12,461	216,210	19,108	419,709	364,074	421*	17,000	346,653	82,313
Quincy, Omaha & Kansas City	262	42,468	14,864	62,485	11,062	13,765	1,400	29,528	3,120	58,875	3,610	.....	2,450	1,160	4,231
St. Joseph & Grand Island	319	88,188	26,017	122,929	14,712	14,411	4,730	45,922	3,753	83,528	39,401	424	5,143	34,682	2,064
St. Louis, Iron Mountain & Southern	2,608	1,402,300	316,138	1,876,196	289,431	274,936	46,481	657,165	61,754	1,329,767	546,429	167*	63,161	483,101	183,045
Santa Fe, Prescott & Phoenix	257	72,462	26,582	104,691	16,731	6,949	6,140	24,351	4,586	58,757	45,934	.....	.....	45,934	8,351
Southern Indiana	237	69,989	10,202	82,118	8,203	10,625	1,789	26,432	5,544	52,593	29,525	.....	6,929	22,596	‡9,148
Stephenville, North & South Texas	43	4,327	1,123	5,858	616	1,455	170	2,701	573	5,515	343	.....	91	252	.....
Texas Central	268	60,608	24,316	92,057	18,062	14,671	1,153	31,296	4,767	69,949	22,108	.....	3,058	19,050	10,514
Trinity & Brazos Valley	455	138,433	11,298	152,996	38,093	21,680	4,212	77,797	12,512	154,294	1,298*	.....	3,300	4,598†	23,130
Vicksburg, Shreveport & Pacific	171	68,536	29,948	108,705	21,326	18,024	3,414	38,605	4,316	85,685	23,020	.....	6,000	17,020	5,335
Western Maryland	543	356,947	45,873	422,234	40,302	70,289	6,876	152,702	13,206	283,375	138,859	.....	16,500	122,359	44,591
EIGHT MONTHS OF FISCAL YEAR.															
Alabama & Vicksburg	143	$671,435	$304,839	$1,053,440	$170,725	$218,848	$26,626	$344,805	$39,792	$860,796	$252,644	.....	$33,170	$219,474	$5,940
Bessemer & Lake Erie	201	3,810,259	210,112	4,063,097	393,483	771,946	47,457	1,099,480	73,355	2,385,721	1,677,376	.....	67,000	1,610,376	‡51,870
Buffalo & Susquehanna	373	1,356,285	137,587	1,542,796	261,791	359,706	19,827	590,083	55,153	1,286,560	256,236	$842*	32,000	223,394	104,103
Central Branch	388	857,588	228,596	1,168,728	184,324	148,868	26,433	400,640	30,663	790 928	377,800	.....	76,000	301,800	41,369
Central New England	294	1,314,026	225,312	1,632,680	264,643	164,425	12,935	566,360	23,411	1,071,774	600,906	.....	44,800	556,106	334,006
Chicago, Cincinnati & Louisville	285	676,637	190,912	911,797	204,897	199,641	62,698	402,430	47,524	917,190	5,393*	.....	26,635	32,028†	26,254
Chicago, Peoria & St. Louis	255	805,761	223,301	1,080,858	151,552	242,659	48,808	455,152	37,846	938,071	144,841	.....	36,200	108,641	36,693
Cleveland, Akron & Columbus	210	896,954	300,416	1,306,128	153,154	230,782	18,415	427,707	24,210	854,268	451,860	.....	50,222	401,638	49,350
Cleveland, Lorain & Wheeling	194	2,202,820	153,538	2,507,148	253,300	458,325	48,326	854,917	48,092	1,662,960	844,188	.....	75,251	768,936	‡155,906
Cumberland Valley	162	1,200,467	384,146	1,667,524	158,725	153,475	30,310	520,480	43,544	906,534	760,990	4,333	29,703	735,620	‡2,264
Detroit & Mackinac	348	498,400	195,068	737,181	123,000	121,259	14,846	250,498	21,936	531,539	205,642	2,573*	57,918	145,151	‡36,978
Duluth & Iron Range	168	4,631,951	150,245	4,837,975	556,912	362,129	3,227	816,257	79,988	1,818,513	3,019,462	4,692	196,043	2,828,111	‡234,992
Duluth, Missabe & Northern	282	6,593,323	235,916	6,867,182	565,493	610,987	10,079	916,674	98,694	2,201,927	4,665,255	34,396	279,710	4,419,942	‡528,903
Elgin, Joliet & Eastern	239	1,569,982	307	1,622,708	171,470	261,755	20,543	535,299	61,904	1,050,971	571,737	.....	76,000	495.737	‡54,565
Evansville & Terre Haute	310	899,195	399,423	1,443,016	197,805	197,085	28,777	453,236	50,121	927,024	515,992	2,550*	72,280	441,162	‡4,148
Grand Trunk Western	336	2,324,574	1,156,923	3,702,630	307,822	511,467	162,055	1,429,578	90,690	2,501,612	1,201,018	7,449*	256,000	937,569	402,828
Kanawha & Michigan	177	1,224,441	216,842	1,476,164	283,953	382,371	18,935	454,127	22,565	1,161,951	314,213	161*	53,024	261,027	202,971
Louisiana Ry. & Nav. Co.	343	570,937	87,379	708,962	187,624	94,217	25,653	317,419	42,004	666,917	42,045	.....	27,000	15,045	55,881
Midland Valley	324	437,113	176,471	650,999	156,285	148,108	13,791	218,597	34,716	571,497	79,502	.....	60,083	19,419	‡129,376
Missouri Pacific	3,492	10,373,128	2,707,180	14,483,676	2,005,629	2,165,873	380,547	6,034,484	476,053	11,062,586	3,421,090	11,843*	616,840	2,792,407	196,953
Nevada & California	379	473,023	171,681	704,993	93,198	91,431	6,524	281,823	15,715	488,691	216,302	2,743*	52,267	161,292	‡369,722
New Orleans & Northeastern	196	1,527,224	378,830	2,043,589	197,432	374,343	59,078	689,845	83,958	1,404,656	638,933	.....	60,000	578,933	93,583
New York, Susquehanna & Western	151	1,061,010	398,826	1,652,927	173,393	171,563	11,830	595,708	31,726	984,220	668,707	13,852*	89,660	565,195	80,678
New York, Philadelphia & Norfolk	112	1,462,277	260,013	1,849,317	162,983	334,419	24,821	682,842	85,049	1,290,114	559,203	.....	49,790	509,413	‡62,686
Northwestern Pacific	373	799,971	1,061,108	2,021,653	423,424	285,574	18,082	724,913	74,958	1,526,951	494,702	.....	72,740	421,962	49,539
Pittsburgh & Lake Erie	191	6,858,303	810,562	7,915,918	946,871	727,762	103,582	1,876,170	168,283	3,822,669	4,093,249	2,561*	131,526	3,959,163	‡670,983
Quincy, Omaha & Kansas City	262	365,277	144,280	552,109	134,519	94,328	12,412	253,174	24,043	518,476	33,633	.....	20,110	13.523	22,624
St. Joseph & Grand Island	319	755,513	263,652	1,104,782	161,177	115,939	41,319	364,306	29,612	712,353	392,429	699	31,362	361,766	‡42,500
St. Louis, Iron Mountain & Southern	2,608	11,270,649	3,047,739	15,641,840	2,170,686	2,080,266	349,314	5,215,786	469,615	10,285.667	5,356,173	19,430*	507,796	4,828,947	720,151
Santa Fe, Prescott & Phoenix	257	610,320	212,586	875,324	146,942	71,340	22,601	207,041	37,530	485.454	389.870	.....	.....	389,870	‡41,278
Southern Indiana	237	655,035	108,464	781,951	106,034	138.154	13,367	228,118	51,170	536,843	245,108	.....	55,428	189,680	‡207,541
Stephenville, North & South Texas	43	66,286	12,170	81,189	5,770	6,541	1,298	19,303	4,544	37.456	43,734	.....	734	43,000	.....
Texas Central	268	520,273	282,197	854,817	114,259	111,506	8,255	288,549	34,939	557.508	297,309	.....	18,069	279,240	29,010
Trinity & Brazos Valley	455	1,330,743	112,988	1,466,619	274,691	207,981	34,919	683,349	92,827	1,293.767	172,852	.....	25,399	147,453	445,380
Vicksburg, Shreveport & Pacific	171	547,151	324,610	942,755	162,779	186,790	26,900	291,505	33,714	701.688	241,067	.....	48,452	192,615	55,701
Western Maryland	543	3,247,508	558,670	3,987,800	422,606	592,995	56,108	1,281,366	96,175	2,449.250	1,538,550	.....	132,000	1,406,550	77,164

*Deficit. †Loss. ‡Decrease.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. T. Haggart has been appointed Auditor of the Enid, Ochiltree & Western.

W. F. Every, whose appointment as General Claim Agent of the Northern Pacific, with headquarters at St. Paul, Minn., was previously announced in these columns, was born at Leroy, Minn., April 11, 1872. He finished his high school education at Leroy, Minn., in 1888, and from that year until 1892 attended the Cedar Valley Seminary at Osage, Iowa. He began railway work on January 1, 1895, as a stenographer in the General Claim department of the Northern Pacific, and filled in turn each position in the department, becoming chief clerk in July, 1897, which position he held until his appointment as General Claim Agent.

W. F. Every.

C. J. Dowd has been appointed the Chief Claim Clerk of the Buffalo & Susquehanna, succeeding J. A. Armstrong, resigned.

C. R. Stovel, Right of Way and Claim Agent of the Canadian Northern, has been appointed also Claims Agent of the Duluth, Rainy Lake & Winnipeg.

Wallace Hays Gephart, recently elected President and General Manager of the Central Railroad of Pennsylvania, was born October 18, 1880, at Bellefonte, Pa. He is a graduate of Princeton University of the class of 1902, and during three of his summer vacations worked as locomotive fireman. In June, 1902, he became a clerk in the office of the General Superintendent of the Central of Pennsylvania, and by October had been made chief clerk and assistant to the General Superintendent. On November 1, 1904, he was appointed Assistant General Superintendent, and in February of the next year was made General Superintendent, which position he held until April 12, when he was elected President. The accompanying photograph of Mr. Gephart wac taken in 1902 when he left college.

W. H. Gephart.

The Minneapolis, St. Paul & Sault Ste. Marie, having leased the Wisconsin Central, will hereafter operate that road as a part of its system, to be known as the Chicago division. The following is a list of officers: President, Edward Pennington; Second Vice-President and Traffic Manager, W. L. Martin; Secretary and Treasurer, C. F. Clement; Auditor, C. W. Gardner; Auditor, Chicago division, Robert Toombs, heretofore Comptroller and Auditor of the Wisconsin Central; General Counsel, A. H. Bright; General Solicitor, H. B. Dike; General Attorney, J. L. Erdall; Freight Claim Agent, A. E. Hodson.

W. D. Williams, Mayor of Ft. Worth, Tex., has been nominated by Governor Campbell to succeed the late L. J. Storey as a member of the Texas Railroad Commission.

T. G. Winnett has resigned as President and General Manager of the Erie & Michigan Railway & Navigation Co. C. G. Root has been appointed Vice-President and General Manager.

W. H. Seaman has been elected the President of the Tremont & Gulf, succeeding William T. Joyce, deceased. James Stanley Joyce has been elected the Secretary, succeeding J. M. Jenks, resigned.

In view of the death of Thomas Fitzgerald, Receiver and General Manager of the Norfolk & Southern, H. K. Walcott and H. M. Kerr, Receivers, have been continued by the Federal court as Receivers without a third associate.

Edward S. Keeley, Freight Traffic Manager of the Chicago, Milwaukee & St. Paul, has been elected also Fourth Vice-President, as previously announced in these columns. He was born in 1861 at Peru, Ill. After an education in the public schools he began railway work about 1879 in the Freight Traffic department of the Rock Island & Peoria, now a part of the Chicago, Rock Island & Pacific, at Rock Island, Ill. In 1881 he was associated with the Traffic department of the St. Louis & Southeastern, now a part of the Louisville & Nashville, with office at St. Louis, Mo. In 1883 he was appointed chief clerk to the Division Freight Agent of the Chicago, Milwaukee & St. Paul, and in 1887 was made Division Freight Agent. In 1891 he was appointed Assistant General Freight Agent, and in 1900 was made the General Freight Agent. In 1907 he was appointed the Freight Traffic Manager, which position he now retains in addition to that of the Fourth Vice-President.

E. S. Keeley

Operating Officers.

J. B. Stewart has been appointed Special Assistant to the General Manager of the Erie, with office at New York.

F. H. Thomas, Superintendent of the Bellefonte Central, has been elected the Vice-President and General Manager, and his former office has been abolished.

Robert King has been appointed the Superintendent of District No. 2 of the Atlantic division of the Canadian Pacific, succeeding D. W. Newcomb, assigned to other duties.

J. R. Cameron, General Superintendent of the Canadian Northern, has been appointed also General Superintendent of the Duluth, Rainy Lake & Winnipeg, with office at Winnipeg, Man.

W. B. Cronk, Superintendent of the Smiths Falls section of District No. 2 of the Canadian Pacific, has been elected also the Superintendent of District No. 1, with office at Farnham, Que., succeeding T. Williams, assigned to other duties.

J. P. Connolly has been appointed the Supervisor of Mails of the Philadelphia & Reading, with office at Philadelphia. He will have direct supervision over all matters pertaining

to the railway mail service and will report to Theodore Voorhees, Vice-President.

E. C. Blanchard, Superintendent of the Lake Superior division of the Northern Pacific, with office at Duluth, Minn., has been appointed the General Superintendent of Lines East of Mandan, N. Dak., with office at St. Paul, Minn., succeeding F. W. Gilbert, deceased. George T. Ross succeeds Mr. Blanchard.

M. A. Murphy, General Manager of the Duluth, Rainy Lake & Winnipeg, has been appointed Superintendent. The following officers of the Canadian Northern have been appointed also to similar positions on the Duluth, Rainy Lake & Winnipeg: J. P. Driscoll, Superintendent Car Service; W. Pratt, Jr., Superintendent Sleeping and Dining Cars.

The Minneapolis, St. Paul & Sault Ste. Marie, having leased the Wisconsin Central, will hereafter operate that road as a part of its system, to be known as the Chicago division. The following is a list of the operating officers: General Superintendent, G. R. Huntington; General Superintendent Chicago division, E. F. Potter, formerly General Superintendent of the Wisconsin Central.

William Walliser, whose appointment as Superintendent of the Minnesota division of the Chicago & North Western has been announced in these columns, was born on July 27, 1866, at Chicago. After receiving an education in the Chicago public schools he began railway work on May 20, 1883, as an engine care taker on the Chicago & North Western at West Chicago. On November 10, 1883, he was made a locomotive fireman on the Galena division of the same road. On September 5, 1885, he was made a freight brakeman on the Galena division, and on June 22, 1892, a freight conductor. On November 1, 1901, he was appointed a Trainmaster of the Peoria division, which was under construction at that time. On June 1, 1902, after the Peoria line was completed, he was again made a freight conductor, and on November 7 of the same year was appointed Trainmaster of the Galena division. On November 9, 1903, he was appointed Assistant Superintendent of the Galena division, and on March 17, 1909, was promoted to his present position.

G. T. Neubert, Master Mechanic of the Chicago Great Western at Oelwein, Iowa, has been appointed Master Mechanic of the Northwestern division, with office at St. Paul, Minn. His former office has been abolished and the duties assumed by W. P. Chrysler, Superintendent of Motive Power. Mr. Neubert was born at Fort Wayne, Ind., in 1860, and began railway work as machinist in the Union Pacific shops at Armstrong, Kan., in 1874. In 1880 he went to the Atchison, Topeka & Santa Fe as machinist at Topeka, Kan. In 1892, after working for the Union Pacific, he returned to the Santa Fe as foreman at Dodge City, Kan. In 1892 he was made general foreman at Nickerson, Kan., and by 1897 had become Master Mechanic of the Oklahoma division, with office at Arkansas City, Kan. In 1900, when the Oklahoma and Middle divisions were consolidated, he was placed in charge of the new division, with office at Newton, Kan., and the next year was promoted to Master Mechanic at Topeka, Kan. Later in the same year he was made Master Mechanic of the Kansas City Belt Railway, and in 1908 became Master Mechanic of the Chicago Great Western, which position he has since held.

Traffic Officers.

H. R. Charlton has been appointed the General Advertising Agent of the Grand Trunk Pacific, with office at Montreal.

Charles P. Sumner, Agent of the Cunard Steamship Co. at Boston, Mass., has been appointed Agent at New York, succeeding Vernon H. Brown, retired.

T. V. Murray, Jr., Traveling Freight Agent of the International & Great Northern, with office at Dallas, Tex., has resigned to engage in other business.

B. F. Bayha has been appointed the Chief of the Tariff Bureau of the Chicago, Milwaukee & St. Paul, with office at Chicago, succeeding F. D. Burroughs, transferred.

George W. Housley has been appointed the General Freight Agent of the Little Rock & Hot Springs Western and the Pine Bluff & Western, with office at Hot Springs, Ark.

Frank J. Wolf, Assistant General Passenger Agent of the New York Central & Hudson River, has resigned to go into business with De Val, Greer & Co., bankers, New York.

E. C. Frew has been appointed General Freight and Passenger Agent of the Beaumont & Great Northern, with office at Onalaska, Tex., succeeding G. R. Wansborough, resigned.

R. H. Stansell, District Passenger Agent of the Seaboard Air Line, has been appointed an Assistant General Passenger Agent, with office at Savannah, Ga., succeeding C. F. Stewart, resigned.

F. S. Holbrook, one of the Official Classification representatives on the Uniform Classification Committee, has been chosen Chairman of the Official Classification Committee, succeeding D. O. Ives, resigned.

Charles F. Stewart, Assistant General Passenger Agent of the Seaboard Air Line at Savannah, Ga., has been appointed the Superintendent of the Tariff Bureau of the Southeastern Passenger Association, with office at Atlanta, Ga.

F. S. Brooks, Assistant General Freight Agent of the Gulf, Colorado & Santa Fe, at Galveston, Tex., has been appointed General Live Stock Agent of the Atchison, Topeka & Santa Fe, with office at Kansas City, Mo., succeeding J. I. Conway, deceased.

G. W. Vaux, Assistant General Passenger and Ticket Agent of the Grand Trunk at Chicago, has been appointed General Passenger Agent, with headquarters at Montreal, Que. Mr. Vaux was born at Montreal March 21, 1866, and received his education in the common schools and at Montreal Business College. He began railway work July 13, 1881, as office boy in the Passenger department of the Grand Trunk. In 1885 he was made clerk in the same office, and in 1897 was made chief clerk. In August, 1899, he was appointed Assistant General Passenger and Ticket Agent at Montreal, and in May, 1900, was transferred to Chicago, with the same title. He held this latter position continuously until his recent appointment.

G. W. Vaux.

G. T. Bell, General Passenger and Ticket Agent of the Grand Trunk Pacific and of the Grand Trunk, has been appointed Assistant Passenger Traffic Manager of both these companies. This is a new office, and the office of General Passenger and Ticket Agent of the Grand Trunk has been abolished. H. G. Elliott, Assistant General Passenger and Ticket Agent of the Grand Trunk, has been appointed the First Assistant General Passenger Agent, with office at Montreal, Que.

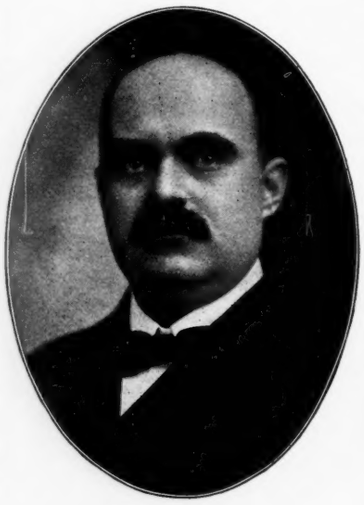
J. B. Dunlap has been appointed a Freight Solicitor of the Southern Railway, with office at Birmingham, Ala. B. Z. Ruff, Traveling Freight Agent at Spartanburg, S. C., has been appointed a Commercial Agent, with office at Spartanburg, and his former office has been abolished. Alexander McBee, Soliciting Agent at Greenville, S. C., has been appointed a Commercial Agent, with office at Greenville, and his former office has been abolished. C. D. Brown has been appointed a Traveling Freight Agent, with office at Abbeville, S. C.

Harold N. Drummond has been appointed a Traveling

Freight Agent of the Chicago, St. Paul, Minneapolis & Omaha, with office at St. Paul, Minn., succeeding E. A. Donnelly, promoted. His territory will be in the states of Minnesota and North Dakota on and north of the line of the Chicago, Milwaukee & St. Paul from St. Paul to the Missouri river and south of the line of the Northern Pacific from Brainerd, Minn., to Mandan, N. Dak., inclusive, including the Bismarck and Underwood branch of the Minneapolis, St. Paul & Sault Ste. Marie; also including the line of the Great Northern and the Northern Pacific south of Saunders and Carlton, Minn.

The Minneapolis, St. Paul & Sault Ste. Marie, having leased the Wisconsin Central, will hereafter operate that road as a part of its system, to be known as the Chicago division. The following is a list of the traffic officers: Second Vice-President and Traffic Manager, W. L. Martin; General Freight Agent, T. E. Sands, heretofore Assistant General Freight Agent of the Soo Line. Mr. Sands succeeds George C. Conn, who has been appointed Freight Traffic Manager of the Pere Marquette, as previously announced in these columns; General Freight Agent, Chicago division, F. E. Singer, heretofore General Freight Agent of the Wisconsin Central; General Passenger Agent, W. R. Callaway.

W. S. Cookson, chief clerk in the Passenger department of the Grand Trunk at Chicago, has been appointed Assistant General Passenger Agent, with headquarters at Chicago, succeeding G. W. Vaux, promoted. Mr. Cookson was born June 12, 1871, at Port Jervis, N. Y., and was educated in the Brooklyn public schools. He began railway work July 15, 1886, in the car record office of the Erie at Jersey City, N. J. On November 1, 1890, he entered the service of the Chicago & Western Indiana in the General Roadmaster's office and a month later was transferred to the ticket office of the Grand Trunk in Chicago. On October 1, 1899, he was made chief clerk in the Passenger department, which position he held until his recent appointment.



W. S. Cookson.

H. P. Hinton, Assistant General Passenger and Ticket Agent of the Grand Trunk, has been appointed the General Passenger Agent of the Grand Trunk Pacific, with office at Montreal, succeeding G. T. Bell, promoted. Mr. Hinton was born at Ottawa, Can., in 1871. He began railway work in 1887 on the Canada Atlantic in the auditing department at Ottawa. In 1891 he was appointed chief rate clerk in the traffic department, and by March, 1898, had become Assistant General Freight Agent. On July 1, 1901, he was appointed General Freight Agent of the Canada Atlantic Railway and also General Freight Agent of the Canada Atlantic Transit Co. In 1903 he was made General Freight and Passenger Agent of both companies. In 1905, when the Grand Trunk took over the Canada Atlantic, his title was changed to General Agent, Passenger department, with office at Ottawa, and he was put in charge of transatlantic business and was given other special duties. In 1906 he was appointed Assistant General Passenger Agent and continued his duties in charge of transatlantic passenger traffic, which position he held until his present appointment.

Engineering and Rolling Stock Officers.

The office of W. H. Elliott, Signal Engineer of the New York Central & Hudson River, has been moved from New York to Albany, N. Y.

A. Shields, Master Mechanic of the Canadian Northern, has been appointed also Master Mechanic of the Duluth, Rainy Lake & Winnipeg.

H. McConkey, Superintendent of Telegraph Maintenance of the Canadian Northern, has been appointed also the Superintendent of Telegraph Maintenance of the Duluth, Rainy Lake & Winnipeg.

J. G. Hopkins has been appointed the Assistant Supervisor of Division 10½ of the Western Pennsylvania division of the Pittsburgh division of the Pennsylvania, succeeding H. R. Catlin, promoted.

J. M. Meade, Engineer of the Eastern Grand division of the Atchison, Topeka & Santa Fe, has been appointed the Engineer Eastern Lines, with office at Topeka, Kan. F. M. Bisbee, Engineer of the Western Grand division, has been appointed the Engineer Western Lines, with office at La Junta, Colo. The office of Engineer of the Central Grand division at Newton, Kan., held by W. H. Earl, has been abolished. These changes are made on account of the recent division of the Santa Fe into two territories.

The Minneapolis, St. Paul & Sault Ste. Marie, having leased the Wisconsin Central, will hereafter operate that road as a part of its system, to be known as the Chicago division. The following is a list of the engineering officers: General Mechanical Superintendent, Theodore A. Foque, formerly Mechanical Superintendent of the Soo Line; Mechanical Superintendent, Chicago division, with office at Fond du Lac, Wis., A. R. Kipp, formerly Superintendent of Motive Power and Cars of the Wisconsin Central; Chief Engineer, Thomas Greene.

T. H. Croswell, whose appointment as Chief Engineer of the Spokane, Portland & Seattle has been announced in these columns, was born January 29, 1867, at Anoka, Minn. He graduated from the University of Minnesota with the class of 1887. He began railway work in June, 1884, as draftsman of the Minnesota & Northwestern, now a part of the Chicago Great Western. In 1885 he was made a rodman and in 1887 transitman. In 1890 he was appointed Resident Engineer of the Duluth & Winnipeg, now a part of the Great Northern, and the Great Northern. From 1890 to 1899 he was engaged in private work and government surveying. In 1899 he was appointed Locating and Assistant Engineer of the Northern Pacific, and in 1903 Division Engineer, with offices at Tacoma and Spokane, Wash. In 1906 he was appointed Principal Assistant Engineer of the Spokane, Portland & Seattle, in charge of the lines east of Pasco, Wash., which position he held until his recent promotion.

Purchasing Officers.

The Minneapolis, St. Paul & Sault Ste. Marie, having leased the Wisconsin Central, will hereafter operate that road as a part of its system, to be known as the Chicago division. The following is a list of purchasing officers: Purchasing Agent, E. T. Stone; General Storekeeper, T. W. Flanagan, formerly Storekeeper of the Soo Line.

J. B. Finley has been appointed the General Storekeeper of the Cananea, Yaqui River & Pacific, the Sonora Railway, the Southern Pacific Lines in Mexico, the Arizona & Colorado, the Arizona Eastern, the Phoenix & Eastern, the Maricopa & Phoenix and the Gila Valley, Globe & Northern, with office at Empalme, Sonora, Mex., succeeding G. V. Green, resigned.

Special Officers.

The Minneapolis, St. Paul & Sault Ste. Marie, having leased the Wisconsin Central, will hereafter operate that road as a part of its system, to be known as the Chicago division. The following is a list of special officers: Land and Industrial Commission, Chicago division, W. H. Killen; Town Site and Industrial Agent, C. A. Campbell.

OBITUARY.

John T. Denniston, Auditor of the Star Union Line of the Pennsylvania, died at Pittsburgh on March 21.

Mace Moulton, Consulting Engineer, died at his home in New York on April 27.

Edward Wiles, Manager of the Commercial Express fast freight line, died on April 22 at his home in Buffalo.

J. S. Oliver, formerly Superintendent of the Dakota division of the Chicago & North Western, died at Los Angeles on April 23.

J. C. Meredith, Engineer in charge of construction on the extension of the Florida East Coast Railway, died at Miami, Fla., on April 20.

Robert G. Curtis, formerly a Superintendent of the New York, New Haven & Hartford, died at his home in Northampton, Mass., on April 20.

Frederic P. Olcott, a member of the board of directors of the New York, Chicago & St. Louis, the Sixth Avenue Street Railway, the Delaware, Lackawanna & Western and various banking institutions, died April 15 at his home in Bernardsville, N. J. He was prominent in the financing of many railway enterprises and was at one time closely connected with the financial problems of the Philadelphia & Reading.

Judge Hosea L. Roberts, at one time General Superintendent of the Anniston & Atlantic, now part of the Louisville & Nashville, died at Mount Clemens, Mich., on April 20. He was formerly a clerk in the New York Central & Hudson River offices and later chief clerk and paymaster on the Pennsylvania. He was Superintendent of Construction of the Anniston & Atlantic, and later became its General Superintendent. In 1890 he left railway work.

General William J. Palmer, railway builder and officer, and founder of Colorado Springs, Colo., died on March 13. He was born near Leipsic, Del., on September 18, 1836, and was educated in the private and public schools of Philadelphia, Pa. He began railway work in 1853 as a rodman of an engineering corps of the Hempfield Road, now a part of the Baltimore & Ohio. In 1856 he went to England, where he spent a year in travel and study. On his return he was elected Secretary and Treasurer of the Westmoreland Coal Co. A year later he was appointed the private secretary to J. Edgar Thomson, President of the Pennsylvania Railroad. Andrew Carnegie was at that time secretary to the Vice-President of the Pennsylvania. In 1861, at the outbreak of the Civil War, Palmer entered the Union army as a captain of volunteers and four years later, when only 29 years old, was mustered out as a brigadier-general. He then became Treasurer, Director of Surveys and Manager of Construction of the Kansas Pacific, now the Kansas division of the Union Pacific. To him was largely due the credit of organizing and securing financial backing for the Denver & Rio Grande, and in 1870 he was elected its President. A few years later he was one of the organizers of the Colorado Fuel & Iron Co. and was elected its first President. In 1882 and 1883 he built the Rio Grande Western and became President of that road. In August, 1883, he resigned the Presidency of the Denver & Rio Grande in order to complete the Mexican National, of which he was President for the seven following years. In 1901 he sold his interests in the Rio Grande Western to the Denver & Rio Grande. He was for several years also Vice-President of the Mexican Northern and President of the Mexican National Construction Co. This was after General Palmer was 65 years old, although he still retained offices at New York and Colorado Springs.

W. J. Palmer.

As a soldier in the Civil War he won much distinction. General George H. Thomas wrote of him: "There is no officer in the regular or volunteer service who has performed the duties which have devolved upon him with more intelligence, zeal or energy than General Palmer, whose uniformly distinguished success throughout the war places his reputation beyond controversy." On his retirement from business in 1901, on the sale of his interest in the Rio Grande Western, he and a few other large stockholders distributed among the 104 officers and several hundred employees of the road the sum of $1,000,000. This incident was characteristic of General Palmer's generosity both before and after his retirement. He was the founder of Colorado College and one of its first trustees. In the fall of 1906 he was thrown from a horse and received injuries that brought on partial paralysis, rendering him a cripple, and this accident was mainly the cause of his death.

The following well deserved tribute is from a letter, by Rev. Samuel H. Bishop, published in the New York *Evening Post*:

* * * General Palmer won my reverent regard and admiration, as well as friendship. He was one of the most splendidly virile moral personalities I ever knew, a man with a master conscience. In some respects he was unique. His integrity was imposing, but without pedantry or officiousness; his moral perceptions acute and finely discriminating, yet never tinged with anything like Pharisaism; his standards lofty, but his judgments of others both gentle and generous; his intellect keen and severe, but his sympathies broadly inclusive.

Love of justice was in him a divine passion, and generosity was both an instinct and a principle. He could afford to be, as he was, an aristocrat, because he was so fundamentally a democrat. I have never known a man whose moral judgments were surer and more penetrating than his, whose insight into the moral issues of politics was deeper and clearer, or whose leadership, where I did not know the way, I could more confidently follow. If Lecky, or Morley, or the Ethical Culture Society had wished to personify the incorruptible integrity, the intrepid conscience, the clean and high thinking, and the noble living for which they give us the rules, I think they could have found no better exponent than was General Palmer. He was reserved in utterance, modest as to his estimate of his own personal ability; but I think there has been no man in this generation whose influence upon those who knew him counted more positively for the great and final issues of personal conduct and of public policy than did his. General Palmer was the finest unconscious Christian I have ever known, and belongs in the category of such men as Socrates, Plato, John Stuart Mill, Lecky and Morley.

Frederick W. Gilbert, General Superintendent of the Northern Pacific, died after a brief illness of two weeks at St. Paul, Minn., on Saturday, April 17. The Northern Pacific has lost a reliable and efficient railway officer, a strict disciplinarian, but a man who never asked any one under him to do what he was not capable of doing and willing to do himself, and one who never allowed himself to be a figure-head in his department. Mr. Gilbert's father, William Bradford Gilbert, was an engineer of note and was well-known for his work on the Erie. After graduating from Cornell, Mr. Gilbert became, in 1870, an Assistant Engineer on the New York & Oswego Midland, now the New York, Ontario & Western. In 1873 he was made Assistant Engineer on the New York, Lake Erie & Western, now the Erie, and in 1881 he became Engineer in charge of shop construction on the Northern Pacific at Brainerd, Minn. By 1885 he had become Superintendent of the Rocky Mountain division, and in 1888 was made Superintendent of the Coeur d'Alene division. In April, 1903, he was made General Superintendent, the duties of which position he has since performed with a loyalty and straightforward frankness and with an unassuming responsibility in carrying out important work that has won him the respect and confidence of those with whom he had to do. Mr. Gilbert leaves a widow and a cousin, Bradford Lee Gilbert, an accomplished architect, who has designed many notable railway stations and structures in different parts of the country.

Railroad Construction.

New Incorporations, Surveys, Etc.

ACME, RED RIVER & NORTHERN.—According to press reports, track laying has been started on the extension from Acme, Tex., west into Cottle county. (March 19, p. 651.)

ARNPRIOR & PONTIAC.—A charter has been granted by the Canadian Parliament to build from a point on the Canadian Pacific, between Quyon, Que., and Campbell's Bay, south across the Ottawa river to Fitzroy Harbor, Ont., thence westerly via Arnprior to a point on the Kingston & Pembroke near High Falls, in Renfrew county, about 40 miles; also to build from Fitzroy Harbor easterly via Britannia to a point on the Grand Trunk, near South March, in Carleton county, 25 miles, and to build a bridge over the Ottawa river. The incorporators include: A. H. N. Bruce, R. Bruce and J. G. Gibson, of Ottawa; J. Bell, of Arnprior, and H. Kedey, of Fitzroy Harbor.

BUFFALO, ROCHESTER & PITTSBURGH.—Bids are being asked for line revision work on two miles of the Clearfield & Mahoning division near Rockton, Pa.

CAIRO & NORFOLK.—Work is under way on the first 60 miles east from Fort Jefferson, near Wickliffe, in Ballard county, Ky., east. The Atlantic & Cairo Construction Co., New York, has the general contract. Projected from Cairo, Ill., east to tidewater at Norfolk, Va. On the first three sections, from Cairo to Hopkinsville, Ky., 115 miles, the work will be light, with maximum grades of 6 per cent. and maximum curves of 3 deg. The work will include two concrete bridges, one over the Tennessee river, 1,800 ft. long, and one over the Cumberland river, 1,100 ft. long. L. W. Goode, Pres., 111 Broadway, New York, and C. H. Delano, Gen. Mgr. and Ch. Engr., Mayfield, Ky.

CANADIAN NORTHERN.—Work is said to have been started on a branch from Vegreville, Alb., southwest to Calgary, about 200 miles.

CANADIAN PACIFIC.—Contract is said to have been given to Stewart & Hewitson, of Port Arthur, Ont., for the construction of all the concrete culverts and bridges to be built between Port Arthur, Ont., and White River during the next five years.

CHICAGO & NORTH WESTERN.—An officer writes that the Board of Public Works has approved the plans for track elevation work on the south side of Milwaukee, Wis., and work has been started. The improvements include raising the tracks over Chicago avenue, Lincoln avenue, Becker street and Kinnickinnic avenue with the necessary approaches; also putting in a new double-track bridge over the Kinnickinnic river. It is expected to have all the work finished by October of this year. (April 23, p. 918.)

CHICAGO, INDIANAPOLIS & LOUISVILLE.—Plans are said to have been made for building new yards at Bloomington, Ind., to have a capacity of about 600 cars. A new concrete, brick and stone roundhouse, with a glass dome and stalls for 17 engines, is to be built soon.

About 1,500 ft. of new side track has recently been laid at Monon, Ind. The company is planning to lengthen many of its side tracks to accommodate its freight service.

CINCINNATI, LOUISVILLE, LEXINGTON & MAYSVILLE TRACTION.—Incorporated in Kentucky, with $10,000,000 capital, to build from Cincinnati, Ohio, south to Lexington, Ky., and from Maysville west to Louisville, with connection at Dry Ridge, in Grant county, in all about 250 miles. W. T. S. Blackburn, Pres., Dry Ridge; J. Glascock, V.-Pres., Williamstown, and J. McCoy, Sec., Dry Ridge.

CLEAR LAKE NORTHERN.—Incorporated in California to build from Pieta, Cal., on the Northwestern Pacific, east to Highland Springs, and thence northwest via Kelseyville to Lakeport, 31 miles. C. M. Chase, Pres.; W. L. Gerstle, Secy. and Treas.

COPPER RIVER RAILWAY.—According to press reports, a large force of men are shortly to be put at work on this line, building from Cordova, Alaska, or Valdez north to Bonanza, about 195 miles. M. J. Heney, 514 Coleman building, Seattle, Wash., is building the line. (Sept. 25, p. 1022.)

CRYSTAL CITY & UVALDE.—Incorporated in Texas with $50,000 capital and headquarters at Crystal City, to build from Uvalde, Tex., on the Southern Pacific, south to Crystal City, in Zavalla county, 44 miles. A. R. Ponder, Pres., San Antonio; J. A. Weir, Sec., Uvalde. I. T. Pryor and H. L. Howard, of San Antonio, are incorporators.

CUBA RAILROAD.—It is understood that this company will build 200 miles of extensions during the coming summer.

ESTACADO & GULF.—Press reports indicate that additional grading contracts are to be let soon. (March 19, p. 656.)

FLORIDA & EAST COAST.—See this company under Iron and Steel.

FORT SMITH & WESTERN.—Surveys said to have been made for an extension from El Reno, Okla., southwest to Lone Wolf, about 85 miles. (Dec. 11, p. 1559.)

FORT WAYNE & TOLEDO (ELECTRIC).—Organized in Indiana, with $100,000 capital. An officer writes that the proposed route is from Ft. Wayne, Ind., northeast via Maysville to Hicksville, Ohio, thence via Farmer to Bryan, 45 miles, with a northern extension to Montpelier, 10 miles. Work, it is expected, will be started soon. R. T. Bastress, Gen. Mgr., Harlan, Ind.

GRAND TRUNK PACIFIC.—Work is said to have been started on a branch from Wainwright, Alb., to Calgary.

Work, it is said, will be started this summer from Melville, Sask., on a line south to the United States boundary; also north from Melville to Hudson Bay.

An officer says that about $10,000,000 will be spent for construction work in western Canada during this year.

GREAT NORTHERN.—An officer writes regarding the reports that construction will be started at once on a line from Winnipeg, Man., south to Noyes, Minn., that no instructions have yet been given to start the work. (April 23, p. 918.)

GREAT SOUTHERN.—This road is now in operation from The Dalles, Oregon, for 30 miles south to Dufur. We are told that if an extension is built it will be from the southern terminus at Dufur south to Tygh, about 20 miles. Regarding the reports that negotiations are pending for the sale of this road nothing definite has taken place, although a number of offers to buy have been made.

GULF & NORTHWESTERN.—Incorporated in Kansas, with headquarters at Goodland, Kan., to build from a point in northwestern Kansas southwest to Pueblo, Colo.; also from a point on the above mentioned line in Cheyenne county, Kan., southeast to Englewood, in all about 450 miles. The incorporators include: J. F. Kimmel and B. Dyatt, of Goodland; J. W. Tibbles, Dresden; C. C. Evans, of Colby, and R. B. Ketchum, of Canyon City, Colo.

KANSAS NORTHWESTERN.—Incorporated in Kansas to build from Benkelman, Neb., on the Chicago, Burlington & Quincy, southeast to Wichita, Kan., about 325 miles. E. W. Moses, Pres., and Geo. Brinkman, Treas., Great Bend, Kan.

MEXICAN ROADS.—Consul Thomas W. Voetter, of Saltillo, Mex., writes to the Bureau of Manufactures that the development of the Mexican project for building a railway between Monclova, Coahuila, and Chihuahua, in Chihuahua, is progressing, as the following indicates: "I have been informed that contracts have been signed by the state governments of Coahuila and Chihuahua by the terms of which a subsidy of about $4,000 United States currency per mile will be granted the enterprise. This is estimated by an engineer well acquainted with the route of the proposed road to be sufficient for grading and bridges. Arrangements have been made with French banking interests for the sale of the bonds necessary to complete the road." (Oct. 16, p. 1176.)

According to reports from Torreon, Mex., surveys are now being made by W. F. Lineberger, of Bermejillo, Dur., to build a line from Bermejillo to the San Juan mine in the Mapimi district, about 14 miles, to haul ore from the San Juan and adjoining mines to the main line of the Mexican Central. It is expected that grading work will be started early in May.

MISSISSIPPI ROADS.—C. H. Pond, of Moorehead, Miss., is said to be organizing a company to build from Watervalley, Miss., on the Illinois Central, southeast to Calhoun City, on the Mobile & Ohio, about 40 miles.

MISSOURI, OKLAHOMA & GULF.—According to press reports, contracts have been let for about 20 miles from Allen, Okla., south to Tupelo, and contracts for 35 miles additional are soon to be let. (April 16, p. 871.)

OKLAHOMA UNION TRACTION.—Incorporated in Oklahoma, with $100,000 capital, to build from Sapulpa, Okla., northeast to Tulsa, 20 miles. The estimated cost of the line is $300,000. The incorporators include: A. Small, E. Tucker, G. C. Stebbins, C. L. Holland and S. A. Orcutt, all of Tulsa.

PENSACOLA, MOBILE & NEW ORLEANS.—Work has begun on an extension to Mobile, Ala., about 50 miles.

ST. LOUIS & CHESTER.—Incorporated in Illinois with $100,000 capital and headquarters at East St. Louis to build from East St. Louis, Ill., south through St. Clair, Monroe and Randolph counties to Chester, about 55 miles. The incorporators include: R. Stecher, Murphysboro, Ill.; E. W. Ziegenhein and R. A. Slack, of East St. Louis; W. F. Bentzen and E. Schiwitz, of St. Louis, Mo.

SAN DIEGO & ARIZONA.—According to press reports, bids are to be asked about May 1 to build the first section from National City, Cal., south to Tijuana, in Lower California, about 15 miles. The projected route from Tijuana is east parallel to the international boundary to the Jacumba valley, thence north into California and east through Carisso canyon and the Imperial country to the Colorado river. John D. Spreckles, San Francisco, is interested.

SOUTH DAKOTA ROADS (ELECTRIC).—Capital is said to have been secured and the necessary right-of-way arranged for, to build from Sioux City, Iowa, northwest to Centerville, S. Dak., about 60 miles. F. Heglin and J. Norran, of Daylesburg, S. Dak., and A. S. Anderson, of Alsen, S. Dak., are interested.

SOUTHERN PACIFIC (MEXICO).—According to press reports from Mazatlan, Mex., a section of the Guadalajara extension was recently opened for traffic from Culiacan, Sin., south to Mazatlan, about 150 miles. (March 19, p. 661.)

SPOKANE, PORTLAND & SEATTLE.—An officer of the Northern Pacific writes regarding the construction of the new joint line of the Northern Pacific and the Great Northern, from Portland, Ore., along the north bank of the Columbia river to Pasco, Wash., thence to Spokane, that it is said to be on a larger scale and probably more perfect than any other work which has been undertaken in the West for some years. The line from Portland to Pasco has a .2 per cent. grade, with maximum curves of 3 deg. The grade from Pasco to Spokane is .4 per cent., with maximum curves of 3 deg.

SUMPTER VALLEY.—Press reports indicate that this company will build an extension from its present western terminus at Austin, in Grant county, Ore., southwest via Prairie City to Canyon City, about 30 miles, and eventually south to a point in the Harney valley. (Sept. 4, p. 890.)

TOLEDO, ST. LOUIS & NEW ORLEANS.—An officer writes that contracts will probably be let in July or August for building this line. The projected route is from Carmi, Ill., south via Newhaven, Ridgway, Lawler, Karber's Ridge and Golconda to Brookport, with a branch from Golconda southwesterly to Thebes, in all about 145 miles. Work will include four steel bridges and a 2,100-ft. tunnel. N. M. Burns, Pres., 1622 Peirce building, St. Louis, Mo. (April 16, p. 872.)

TIMPSON & NORTHWESTERN.—Contracts may be let in June for building an extension. W. G. Ragley, Pres., Timpson, Tex.

TERRE HAUTE, INDIANAPOLIS & EASTERN (ELECTRIC).—According to press reports, surveys have been finished for an extension of the branch which now has its western terminus at Danville, Ind., southwest via Amo to Sullivan. Most of the right-of-way has been secured. Part of the work is completed between Danville and Amo, seven miles, where connection is made with the main line. The extension is being built to reach the coal fields owned by the company in Clay and Owen counties. The Danville line and the new section to Amo when finished will be used as the main line for traffic between Indianapolis and Terre Haute.

Railroad Financial News.

BOSTON & ALBANY.—The Massachusetts Railroad Commission has been asked to approve an issue of $4,500,000 4 per cent. 25-year bonds, the proceeds to be used for extensions and improvements at the East Boston terminals and to reimburse the New York Central & Hudson River for construction work already financed by the Central.

CHESAPEAKE & OHIO.—See Virginian Railway.

CHICAGO, BURLINGTON & QUINCY.—The holders of the following bonds are offered the privilege of exchanging them for general mortgage 4 per cent. bonds of 1908-1958:

	Outstanding.*	Maturing.	Premium offered.
Iowa Div. mortgage sinking fund 4s	.....	1919	None.
Southwestern Div. sinking fund 4s	$3,200,000	1921	"
Denver Exten. sinking fund 4s	7,968,000	1922	"
Debentures, 5 per cent	9,000,000	1913	$20
Nebraska Ext. sinking fund 4s	24,214,000	1927	None.
Burl. & Mo. R. R.R. in Neb., 6s	8,751,000	1918	$20
Republican Valley R.R. sinking fund 6s,	1,078,000	1919	20
Hannibal & St. Joseph R.R. 6s	8,000,000	1911	30

*Excluding bonds canceled under sinking fund provisions, but including bonds held in sinking funds.

Most of these divisional bonds are subject to compulsory retirement at par through the operation of sinking funds.

DENVER, NORTHWESTERN & PACIFIC.—The Colorado-Utah Construction Co. collateral trust notes dated February 6, 1909, have been called for payment at 101 on May 1. D. H. Moffat, who guarantees the notes, is President of both the Denver, Northwestern & Pacific and the Construction company, and is quoted as saying: "I have perfected my plans for financing the road from Steamboat Springs (Colo.) to Salt Lake (Utah), 364 miles." The road is now in operation from Denver, Colo., to Steamboat Springs, 214 miles.

GULF, COLORADO & SANTA FE.—See St. Louis & San Francisco.

HOCKING VALLEY.—The Circuit Court of Franklin county, Ohio, on April 24, handed down a decree ousting this company from control, through a syndicate, of the Zanesville & Western, the Toledo & Ohio Central, the Kanawha & Michigan, the Sunday Creek Coal Company, the Sunday Creek Company, the Continental Company and the Buckeye Coal & Railway Company. The decision was rendered under the Ohio anti-trust law.

INTERCOLONIAL RAILWAY.—A board consisting of M. J. Butler, Deputy Minister of Railways and Canals; D. Pottinger, General Manager, Canadian Government Railways; E. Tiffin, Traffic Manager, Intercolonial Railway, and F. P. Brady, formerly General Superintendent of the Lake Superior division of the Canadian Pacific, has been placed at the head of the management of the Intercolonial.

KANAWHA & MICHIGAN.—See Hocking Valley.

MICHIGAN CENTRAL.—J. P. Morgan & Co., New York, who together with the National City Bank and the First National Bank offered $10,000,000 4 per cent. debenture bonds of the Michigan Central of 1909-1929 at 95, announce that the price of the unsold remainder will be 96½.

MISSISSIPPI CENTRAL.—See Natchez & Eastern.

MUNICIPAL TRACTION (CLEVELAND).—The receivers have been authorized by the Federal court to make payments aggregating $556,000 out of the $740,000 cash on hand. The majority of the payments are to be made to or on account of the Cleveland Railway.

NATCHEZ & EASTERN.—The entire outstanding $1,540,000 first mortgage 6 per cent. bonds of 1907 have been called for redemption at par on June 1. It is understood that this is preparatory to the merger of the Natchez & Eastern and the Mississippi Central controlled by the same interests. The line of the two companies in operation runs from Natchez, Miss., to Hattiesburg.

NEW YORK CENTRAL & HUDSON RIVER.—See Boston & Albany.

NORFOLK & WESTERN.—See Pennsylvania.

PENNSYLVANIA.—This company and its subsidiaries have repurchased from Kuhn, Loeb & Co., New York, between $15,-

000,000 and $16,000,000 stock of the Norfolk & Western. See reference to this purchase in the review of the annual report of the Pennsylvania in another column.

Pittsburgh, Shawmut & Northern.—The New York Public Service Commission, Second District, has authorized the receiver to issue $1,600,000 receiver's certificates, the proceeds of the sale of these certificates to be used to refund receiver's certificates maturing in September, 1910, and March, 1911, but payable at the option of the receiver in 1909, and also for additions and improvements.

Pontiac, Oxford & Northern.—The sale of this road at an upset price of $400,000 has been adjourned from April 8 to June 17.

St. Louis & San Francisco.—Press despatches from Dallas Tex., say that the St. Louis & San Francisco has bought the Dallas & Paris line of the Gulf, Colorado & Santa Fe, and will run trains after June 1 from St. Louis, Mo., to Dallas, Tex., and Fort Worth, via Paris.

Southern Pacific.—The *Commercial and Financial Chronicle* says that "it is understood that the stockholders subscribed for practically the entire $44,000,000 convertible 4 per cent. bonds offered recently to stockholders and underwritten by Kuhn, Loeb & Co., New York."

Southern Railway.—The company has sold about $1,500,000 4½ per cent. equipment trust bonds. They were sold at this time, it is said, because of the present good demand for this class of security rather than because of any present need of money by the company.

Toledo & Ohio Central.—See Hocking Valley.

Virginian Railway.—Arrangements have been made by which the Virginian is to have trackage rights over the Chesapeake & Ohio tracks from Deepwater, W. Va., to St. Albans, 44 miles. St. Albans is about 12 miles west of Charleston.

Western Pacific.—The syndicate headed by Blair & Co., Wm. A. Read & Co. and William Salomon & Co., all of New York, which bought the $50,000,000 Western Pacific first mortgage 5 per cent. bonds of 1903-1933, has been dissolved, all the bonds having been sold. Procter & Borden, New York, are offering $2,000,000 of these bonds at a price to yield about 5 per cent.

Zanesville & Western.—See Hocking Valley.

FOREIGN RAILWAY NOTES.

The Dominican government is pushing the project of building a railway between the capital and the town of La Vega. This, with the construction of a short line between La Vega and Mocha, will give railway connection between Puerto Plata, the most important seaport of the northern coast, and Santo Domingo, the capital and most important city of the Republic, and will open up a rich agricultural section. The road will also be of great importance from a military standpoint.

The Chinese company which owns the Hanyang steel plant, Tah Yeh iron mines and the Ping Siang coal mines is about to open a large coal station in Hankow. It intends to build 100 cargo boats of 200 tons capacity each and 100 of 100 tons capacity, together with powerful shallow-draft tugboats to handle the cargo boats in fleets. It now has one freight steamer and is about to build two more. The various steamers plying the Yangtze are testing the company's coal, and so far the reports have been very satisfactory.

The Nicaraguan government has made a contract with private parties for the construction of a railway from San Juan del Sur, on the Pacific coast, about 16 miles to the port of San Jorge or other ports on Lake Nicaragua. This contract was entered into in January, 1908, but was not officially published until February 20, 1909. While the proposed road would open up rich agricultural country and greatly facilitate transportation in southeastern Nicaragua, the parties holding the contract have so far been unsuccessful in securing the necessary capital. The territory to be served is along the old proposed Nicaragua canal route.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Kansas City, Mexico & Orient is in the market for 20 locomotives.

The Chicago, Indianapolis & Louisville has ordered three locomotives from the American Locomotive Co.

The Boston & Maine has ordered 20 eight-wheel passenger, 20 Mogul freight and 10 six-wheel switching locomotives from the American Locomotive Co.

The Chesapeake & Ohio, reported in the *Railroad Age Gazette* of February 5 as having ordered 15 locomotives from the American Locomotive Co., with an option on 15 more, has ordered 20 locomotives from the American Locomotive Co. It is understood that the entire order of 35 locomotives is for delivery by November.

A. V. Kaiser & Co., Philadelphia, Pa., are in the market for two or three second-hand 60-ton Mogul locomotives with cylinders 18 in. x 24 in. Detailed specifications and photographs are required, and prices, if possible, should be quoted on equipment in export shipping shape, f.o.b. alongside steamer in New York for foreign shipment.

The Cuba Railroad has ordered 10 consolidation freight and 3 ten-wheel passenger locomotives from the American Locomotive Co. These locomotives will be equipped with fire-tube superheaters.

General Dimensions.

	Consolidation.	Ten-wheel.
Weight on drivers	154,000 lbs.	98,000 lbs.
Weight, total	176,000 "	141,000 "
Cylinders	24 in. x 26 in.	21½ x 26 in.
Diameter of drivers	54 in.	68 in.
Boiler, diameter	71¼ in.	68 "
Boiler, work'g st'm press.	160 lbs.	160 lbs.

The Quebec Contracting Co. has ordered two four-wheel locomotives from the Montreal Locomotive Works, Ltd. These locomotives will be for use on the National Transcontinental Railway and are now building.

General Dimensions.

Weight of engine	36,000 lbs.
Cylinders	10 in. x 16 in.
Diameter of drivers	30 in.
Boiler, type	Straight top
" working steam pressure	150 lbs.
Firebox, length	42 in.
" width	24 "
Tubes, number	98
" outside diameter	1¾ in.
" length	8 ft. 2 in.
Water capacity	600 imp. gals.
Coal capacity	600 lbs.

The Temiscouata Railway has ordered two 10-wheel locomotives from the Montreal Locomotive Works, Ltd.

General Dimensions.

Weight on drivers	83,000 lbs.
" of engine	108,500 "
" of engine and tender	197,500 "
Cylinders	18 in. x 24 in.
Diameter of drivers	51 in.
Boiler, type	extended wagon top
" working steam pressure	160 lbs.
Firebox, length	90 in.
" width	33¾ "
Tubes, number	198
" outside diameter	2 in.
" length	12 ft. 3 "
Wheel base, rigid	10 " 6 "
" " engine	20 " 8 "
" " engine and tender	49 "
Water capacity	3,500 imp. gals.
Coal capacity	8 tons

The International Railway of New Brunswick has ordered one 10-wheel locomotive from the Montreal Locomotive Works, Ltd.

General Dimensions.

Weight on drivers	83,000 lbs.
" engine	108,000 "
" total, engine and tender	197,000 "
Cylinders	18 in. x 24 in.
Diameter drivers	51 in.
Boiler, type	extended wagon top
" working steam pressure	160 lbs.
Firebox, length	90 in.
" width	33¾ "
Tubes, number	198
" diameter	2 in.
" length	12 ft. 3 "
Wheel base, rigid	10 " 6 "
" " engine	20 " 8 "
" " engine and tender	49 "
Water capacity	3,500 imp. gals.
Coal capacity	8 tons

CAR BUILDING.

The Lehigh Valley is asking prices on 16 passenger cars.

The Pennsylvania is to build 15 all-steel dining cars at its Altoona shops.

The Central of New England is asking prices on six passenger coaches.

The Northern Ohio Traction & Light Co., Akron, Ohio, is in the market for one 52-ft. private car.

The Buffalo, Rochester & Pittsburgh is in the market for three combination baggage and smoking cars.

The Coal & Coke Railway is said to have ordered two coaches and one combination car from the Barney & Smith Car Co. This item has not been confirmed.

The Cuba Railroad, reported in the *Railroad Age Gazette* of April 9 as being in the market for 100 box and 100 flat cars, has ordered this equipment from the American Car & Foundry Co.

The Western Pacific, as reported in the *Railroad Age Gazette* of April 16, has ordered 1,500 freight cars from the Pressed Steel Car Co. These will be all-steel, 50-ton side dump gondola cars.

The Norfolk & Western, reported in the *Railroad Age Gazette* of April 16 as being in the market for 300 freight cars, is reported to have decided upon building 300 all-steel freight cars in its Roanoke shops. This latter item is not confirmed.

The Boston & Maine, unofficially reported in the *Railroad Age Gazette* of April 23 as being in the market for 900 thirty-ton steel underframe box cars, is said to have ordered this equipment from the Laconia Car Co. This item is not confirmed.

The Salt Lake & Ogden (Electric), Salt Lake City, Utah, reported in the *Railroad Age Gazette* of April 2 as being in the market for twelve 56-ft. cars, six of which will be coaches and six combination passenger and baggage cars, has ordered this equipment from the Jewett Car Co.

A. V. Kaiser & Co., Philadelphia, Pa., are in the market for from 200 to 300 second-hand 30-ton flat cars equipped with air-brakes and automatic couplers. Detailed specifications and photographs are required, and prices, if possible, should be quoted on equipment in export shipping shape, f.o.b. alongside steamer in New York for foreign shipment.

The Southern, reported in the *Railroad Age Gazette* of March 19 and March 26 as asking prices on 114 passenger cars, has ordered 85 passenger coaches from the Pullman Co.; 6 baggage-express, 6 mail-baggage, 6 passenger-baggage and 6 postal cars from the American Car & Foundry Co.; 2 dining and 3 chair cars from the Barney & Smith Car Co.

IRON AND STEEL.

The Marlum Co., Kansas City, Mo., is in the market for 7,700 tons of rails.

The Ann Arbor has ordered 6,000 tons of rails from the Lackawanna Steel Co.

The Chicago & Alton has ordered 1,500 tons of bridge steel from the American Bridge Co.

The Guaymas & Yaqui River has ordered 13,000 tons of rails from the Steel Products Export Co.

The Cuba Railroad is said to have ordered 5,000 tons of bridge steel from the Pennsylvania Steel Co.

The Chicago, Milwaukee & St. Paul has placed an order for 65,000 tons of 90-lb. rails with the Illinois Steel Co.

The Wisconsin Central has ordered 600 tons of structural steel for bridge construction from the Wisconsin Bridge & Iron Co.

The Indianapolis Union Railroad has ordered 400 tons of structural steel for bridge construction from the McClintic-Marshall Construction Co.

The Buffalo, Rochester & Pittsburgh, reported in the *Railroad Age Gazette* of April 16 as asking bids on about 3,500 tons of bridge steel, has ordered about 3,000 tons from the Pennsylvania Steel Co.

The Florida & East Coast, reported in the *Railroad Age Gazette* of March 26 as being in the market for 100 bridge spans and a quantity of rails, has ordered about 11,000 tons of bridge steel from the American Bridge Co. for use on the extension from Knight's Key, Fla., to Key West. There will be 182 plate girder spans, 79 ft. 6 in. long; 12 riveted spans, 125 ft. long, and 12 pin-connected spans, 182 ft. long. The order also includes the steel for two small bridges on the main line.

The Seaboard Air Line will soon place orders for about 1,800 tons of bridge steel to be used in the following structures: Savannah River, Scherzer type lift bridge, weighing about 270 tons, and 12 deck plate girder approach spans; Meherrin Slough, 24 deck plate girder spans and one through plate girder span; Crabes Creek, deck plate girder span; Cedar Creek, plate girder viaduct; Upper Hunter Terminal, through plate girder span. All of these spans are single-track, excepting the one at Upper Hunter Terminal, which is double-track.

General Conditions in Steel.—The financial statement of the United States Steel Corporation shows total earnings, after deducting all operating expenses, of $22,921,268, a decrease of $3,304,217 from the quarter ended December 31, 1908, and an increase of $4,692,253 over the quarter ended March 31, 1908. The surplus after payment of all charges and dividends was $3,026,674 as compared with $5,142,451 for the December 31 quarter, and $7,865 for the corresponding period of 1908. The unfilled orders on hand March 31 last amounted to 3,542,595 tons, a decrease of 60,932 tons from December 31, 1908, and of 222,748 tons from March 31, 1908. This is said to be the poorest showing since September last, when the total was 3,421,977 tons. These figures would seem to reflect past rather than present conditions, as business during the current month is thought to have shown a heavy increase.

RAILROAD STRUCTURES.

ANN ARBOR, MICH.—The Ann Arbor has given the contract for building five bridges to the Toledo-Massillon Bridge Co.

BLOOMINGTON, IND.—See Chicago, Indianapolis & Louisville under Railroad Construction.

CARMI, ILL.—See Toledo, St. Louis & New Orleans under Railroad Construction.

EVANSTON, ILL.—The Chicago & Northwestern will build four new passenger stations at a total cost of about $173,000.

MILWAUKEE, WIS.—See Chicago & Northwestern under Railroad Construction.

OAKLAND, CAL.—Plans and specifications have been made by the Southern Pacific for a new depot. Work on the building will begin immediately after official specifications have been accepted.

PEORIA, ILL.—The Peoria & Pekin Union is preparing plans for a new double-track bridge over the Illinois river. It will cost about $250,000.

PERU, IND.—The Ft. Wayne & Wabash Valley Traction Co. has been granted a franchise by the City Council for a freight and passenger station to be built on the property now used by the company. The structure is to cost $40,000. The company is to take action on the franchise within 30 days.

PORT ARTHUR, ONT.—See Canadian Pacific under Railroad Construction.

TAMPA, FLA.—The new Scherzer type lift bridge which is now being built by the Seaboard Air Line has a clear span of 165 ft. See Seaboard Air Line under Iron & Steel.

WINNIPEG, MAN.—A contract is said to have been given to Haney, Quinland & Robertson, of Toronto, Ont., at $495,000, by the National Transcontinental Railroad Commission (Grand Trunk Pacific) for putting up a combined railway and highway bridge, of steel construction, over the Red river at Winnipeg. (March 26, p. 729.)

Supply Trade News.

The W. K. Kenly Co., Chicago, has been appointed district sales agent for the Ernst Wiener Co., New York, builders of industrial cars.

The Erie & Union, the Titusville Northern and connecting lines are in the market for railway supplies. Address, Jesse L. Straus, Weston, N. J.

The Johnston-Adams Switch Devices Co., Columbus, Ohio, has recently been incorporated by S. A. Johnston, C. B. Adams, G. B. Butten, J. A. Kidwell and J. T. Moore. Capital stock, $100,000.

The Climax Railway Supply Co., Canton, Ohio, has been incorporated with $25,000 capital. The incorporators are: H. B. Stewart, F. W. Stewart, William Simpson, Jay Taylor and Allan R. Simpson.

The Morgan Engineering Co., Cleveland, Ohio, has been given a contract by the Bettendorf Axle Co., Davenport, Iowa, for the cranes for its new steel foundry. The total value of the award is about $90,000.

The Grip Nut Co., Chicago, manufacturer of the Grip-nut and Universal window fixtures, is building a large addition to its works at South Whitley, Ind. The structure will be 50 ft. x 270 ft. and two stories high.

A firm in France which sells many kinds of machinery to steel works and dockyards wants the agency for some concern making pneumatic tools. (Inquiry No. 3342, Bureau of Manufactures, Washington, D. C.)

The National Railway Devices Co., Chicago, has been incorporated to manufacture railway devices, machinery, etc. The incorporators are Frank E. Hinckley, Harry J. Berman and William L. Carlin. Capital stock, $200,000.

Edward C. Sawyer, who was formerly representative of the H. W. Johns-Manville Co., New York, is now associated with H. G. Hammett, Troy, N. Y., manufacturer of Trojan metallic packing, locomotive specialties and machinery.

The Magnetic Locomotive Co., Marquette building, Chicago, has been incorporated to manufacture electrical devices and machinery. The incorporators are Frank B. Tinker, Ward S. Perry and J. R. Merkle. Capital stock, $100,000.

Charles F. McCullough, for 15 years Treasurer of the Kewanee Tube Co., died suddenly from apoplexy at Kewanee, Ill., on April 24, at the conclusion of a bowling game. The Kewanee Tube Co. was acquired about a year ago by the National Tube Co., Pittsburgh, Pa.

James Bennie & Sons, proprietors of the Clyde Engine Works at Cardonald, near Glascow, Great Britain, makers of heavy machine tools for ship yards, structural iron works, boiler shop, etc., have been given a license by the Hanna Engineering Works, Chicago, to manufacture the Hanna pneumatic riveter in Great Britain.

The plans for the transportation exhibtion to be held at Buenos Ayres next year were published in the *Railroad Age Gazette* of April 16, page 863. Casco, Odell Bros. & Co., Buenos Ayres, importers and agents, wish to prepare and take care of exhibits for American manufacturers. The firm will also attend to the selling of the exhibits during or after the exhibition and take orders for other products of its clients.

An American consul in Latin America reports that a railway company in his district intends to build a branch line as soon as the right of way can be secured from the local government officials. He suggests that American contractors and exporters of railway materials, cement, agricultural implements, machinery of various kinds, etc., correspond with the president of the company. (Inquiry No. 3333, Bureau of Manufactures, Washington, D. C.)

George F. Hichborn, General Traffic Manager of the United States Rubber Co., has been appointed also General Traffic Manager of the following companies: The General Rubber Company, New York; the Rubber Goods Manufacturing Co., New York; the Peerless Rubber Manufacturing Co., New Durham, N. J.; the New York Belting & Packing Co., Passaic, N. J.; the Fabric Fire Hose Co., Sandy Hook, Conn.; the Hartford Rubber Works Co., Hartford, Conn.; Morgan & Wright, Detroit, Mich.; the Indianapolis Rubber Co., Indianapolis, Ind.; the India Rubber Co., New Brunswick, N. Y.; the Sawyer Belting Co., Cleveland, Ohio; the Mechanical Rubber Co., Cleveland, Ohio; the Mechanical Fabric Co., Providence, R. I.; the Stoughton Rubber Co., Stoughton, Mass.; the Mechanical Rubber Co., Chicago; the G. & J. Tire Company, Indianapolis, Ind., and the Sandy Hook Reclaiming Works, Sandy Hook, Conn.

Since the first of April a number of orders for steam turbines, steam engines and gas engines have been booked by the Westinghouse Machine Co., Pittsburgh, Pa., and the record for the first two weeks of this month shows a considerable increase over the same period of March. With the anticipated closing of a number of contracts for which negotiations are now pending, the indications are that the April business will make an excellent showing. Among the contracts recently received is an order from the City Electric Co., San Francisco, Cal., for a 15,000 h.p. turbine. This will be the most powerful turbine installed west of the Mississippi. This company has already installed three Westinghouse turbines of a smaller size. The East Pittsburgh shops are also turning out at present for the city of Detroit a 5,000-h.p. turbine, and another of the same size is going to the Nichols Copper Co., Laurel Hill, Long Island, while the Saginaw & Flint Railway, Michigan, has contracted for an 1,150-h.p. turbine and the Alaska Treadwell Gold Mining Co., San Francisco, has ordered two 1,000-h.p. machines of the same type.

TRADE PUBLICATIONS.

Northern Pacific.—An illustrated circular describing Yellowstone Park and giving information regarding railway fares from points on the Northern Pacific system, stop-overs and hotel accommodations, has been issued.

Headlight Legislation.—The Commercial Acetylene Co., New York, is mailing a reprint of an editorial, "Headlight Legislation," by Dr. J. W. Chamberlain, Ophthalmic Surgeon, St. Paul, Minn., which editorial appeared in the *Signal Engineer* of March, 1909.

Beam and Column Data.—The Northwestern Expanded Metal Co., Chicago, has just issued a vest-pocket size pamphlet which contains a large amount of data on concrete beams and columns. This information was compiled by Ernest McCullough, M. W. S. E., Chief Engineer for this company.

Woodworking Machinery.—The S. A. Woods Machine Co., Boston, Mass., has just issued a catalogue which is a very complete description of the uses and design of its No. 59 surfacer. The catalogue is printed on heavy paper and contains a large number of excellent half-tone and line illustrations.

Roofing.—The Standard Paint Co., New York, has just issued a catalogue which contains the results of some 25 years' experience with Ruberoid roofing. The pamphlet contains a large number of illustrations of buildings on which this roofing is used; also a number of re-prints from letters of those who have used the roofing.

Idaho & Washington Northern.—A recent folder issued by the traffic department describes trips that may be made in the Pend Oreille country. Hunting and fishing are the particular attractions, and the folder gives details and advice regarding these, including a summary of fish and game regulations in Washington and Idaho.

Steel Sheet Piling.—The Carnegie Steel Co., Pittsburgh, Pa., has just issued a new pictorial album on the subject of steel sheet piling showing types of construction and examples of installations. The album is printed on heavy paper and it contains a number of full-page line drawings of the details of this piling and a number of full-page half-tone illustrations, showing a number of installations.

Pumps, Pumping Machinery, Etc.—The American Well Works, Aurora, Ill., has issued a folder calling attention to its latest types of machines. The following are illustrated and described: A turbine centrifugal pump, a vertical compound cylinder steam engine, deep well pumps, a drilling machine, an air compressor, a gasolene engine ,a coring machine, an air lift for pumping deep wells and a plain centrifugal pump.

Chicago, Milwaukee & St. Paul.—A folder relating to the Alaska, Yukon, Pacific Exposition is being circulated by this company. The Exposition grounds are fully described and illustrated, and mention is made of a number of points of interest in and around Seattle. Numerous facts are concisely given regarding the Exposition, including information regarding railway fares. Maps of the St. Paul system and of the city of Seattle, as well as a plan of the Exposition grounds, are shown.

Reinforced Concrete Construction.—The Corrugated Bar Co., St. Louis, Mo., has just issued Bulletin No. 7 of its series, "Designing Methods of Reinforced Concrete Construction." This bulletin treats of reinforced concrete conduits and sewers, and includes a large amount of data and formulae which show the method of calculation and design. Bulletin No. 8, which will be published in June, will treat of semi-circular arches. These bulletins have been issued at intervals, and are intended to be used as reference books by practicing engineers.

Atchison, Topeka & Santa Fe.—This road has issued a handsome booklet describing and illustrating El Tovar Hotel, near Grand Canyon, Ariz., and a small folder giving information about many of the hotels and the Harvey meal service along the system. Another folder describes the Alaska-Yukon-Pacific Exposition at Seattle, Wash., and the advantage of visiting California and other points in the Southwest in connection with the trip to Seattle. Another folder relates to the annual meeting of the National Educational Association, which will be held at Denver.

White Pass & Yukon.—"Alaska: Along the Shores and Beyond," is a recent pamphlet issued by the traffic department. The railway runs from Skaguay north to White Horse, 111 miles. Several coastwise steamship lines run to Skaguay. The pamphlet describes these steamship trips as well as the route of the railway and the country it serves. The publication is to be commended for its convenient size, 7½ in. x 4½ in. The text is interesting and the make-up excellent. The taste shown in the illustrations is particularly to be noticed. They are printed in soft grays and browns, which bring out the beauties of the views.

D. C. Motors and Exhaust Fans.—The Crocker-Wheeler Co., Ampere, N. J., has just issued Bulletin No. 113, which supersedes Bulletin No. 81, on the subject of large d.c. motors for direct connection to lathes, hoists, bloom shears, big rolls and ammonia compressors. The important features of construction are clearly explained and illustrated with half-tones which give details of the construction. Bulletin No. 112 describes exhaust fans. A feature which is emphasized in this bulletin is the variety of service to which these fans can be adapted. Besides being used for ventilation in factories, offices, etc., these fans are used for drying lumber, hides, textiles, etc.

European Patent Laws.

A London paper says that by an enactment of December last a law will come into force in June next in Austria containing a section somewhat similar to Section 27 of the British patents act of 1907, by which patents in Austria will be revocable at the expiration of three years from the date of publication, without any notice, if the patentee neglects to work the patent in Austria to an adequate extent. Meanwhile a movement is on foot to secure a more rigid enforcement of the British law in regard to foreign patents. With a view to the better protection of British industries by joint action against foreign patentees who may be thought to have come within the terms of Section 27, the British Manufacturers' Protection Society has been formed and has already secured warm support from numerous quarters.

New Reversed Cylinder Press.

The Watson-Stillman Co., New York, has just introduced a new reversed cylinder forcing press, which should prove a handy tool for pressing bearings and for miscellaneous work. As will be seen from the illustration, a crane bracket and beam extending from one end enables the operator to swing a heavy piece of work onto bracket shelves extending out from each side of the bottom platen. These shelves, 30 in. long by 12 in. wide, are detachable, can be lifted off on jobs where they would be in the way, and are sufficiently strong to support any work that will go into the machine. They will be appreciated by those who have had to push castings or parts into place on the ordinary small platen.

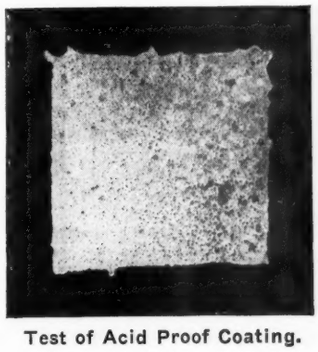
Reversed Cylinder Press.

The motor, mounted on pedestals on top of the press, drives the pump shaft through single reduction gearing. A hand or belted drive is furnished if desired instead of the motor. On the other end of the pump shaft are two eccentrics, each driving one of the pistons of a ¾-in. by 2-in. twin pump, for which the pedestal legs act as reservoirs.

The operating valve is of the single screw stem type, and connected to release the pressure from the work when open, and start the ram down when closed. It will not retain the pressure unless the motor is stopped or the liquid driven through the safety valve. Other types of valves may be substituted to meet special conditions. A gage is furnished to read in tons or pounds per square inch, as desired.

Acid Proof Coating.

The accompanying photograph illustrates a demonstration recently made with acid proof coating made by the Glidden Varnish Co., Cleveland, Ohio. A piece of sheet metal was coated with the acid proof coating, leaving a small portion exposed or unprotected. After 24 hours the coating was dry and the sheet metal was placed in a bath of 30 per cent. nitric acid. At the expiration of 1 hour and 40 minutes the entire section of the exposed sheet metal had been completely consumed by the action of the acid, leaving a strong, firm film of the acid proof coating intact and absolutely unharmed by the action of the acid. This interesting and severe test shows the durability and merits of acid proof coating as a product for use on all metallic surfaces which are submitted to unusually harsh and trying conditions.


Test of Acid Proof Coating.

Safety Parchment for Passes.

A novel safety parchment is made by Charles M. Higgins & Co., 271 Ninth street, Brooklyn, N. Y. It consists of a specially woven linen cloth of extremely fine and close texture, and finished with a novel writing surface. It is recommended for passes or any document in which alteration needs to be guarded against. Its writing surface is absolutely smooth, offering no resistance to the finest pen point, and so thin that ink immediately sinks into the body or texture of the cloth. Since it is impossible to cut or scratch out the ink in the fibre of the cloth, the integrity of the writing depends only upon the unfading color in the ink. The firm also makes Higgins' Eternal ink, which holds in solution a coloring matter, carbon, complete in itself, and not depending on the chemical action of the air to darken it. The weakness of chemical ink is that it is forever subject to atmospheric influence. Higgins' Eternal ink is a fluid hold-

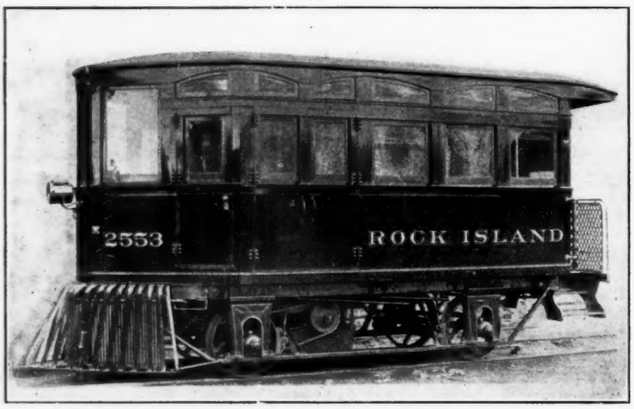
ing pure carbon in solution, and is claimed to withstand without change exposure to air, heat, sunshine and chemicals. Thus it is proof against mutilation, either physical or chemical, and as the fibre holds the ink permanently the parchment is invulnerable. The fibre cannot be disturbed without visible disintegration, and the carbon in the ink cannot be decolorized. It being impossible to alter or change the writing without detection, the material is safe for railway passes, checks and other important documents.

Stover Gasolene Motor Car.

The accompanying illustration shows a gasolene motor car recently built for small branch line service on the Chicago, Rock Island & Pacific.

A partition divides the car into a front and a rear compartment. The front compartment has a seating capacity of 10 passengers and the rear of 16 passengers. The body is of wooden frame construction; the main pillars and poists are of oak or of ash, and the outside wainscoting is poplar, while the doors and inside panels are of California redwood. Proper ventilation is provided by having all windows arranged for raising, including the upper colored glass ones.

The radiator coils are placed between the seats in the main compartment and are connected to the water circulating system of the



Stover Gasolene Motor Car.

motor. The piping is so arranged that the hot water from the engine cylinder jackets can be run through the car. There are two side-bracket acetylene gas lamps in the main compartment and one in the forward compartment. The same storage tank furnishes gas for the headlight.

The motor is 6-cylinder, 60-h.p. The cylinders are cast in pairs, 5½ in. in diameter by 6-in. stroke. The normal speed is 600 r.p.m. Both intake and exhaust valves are mechanically operated on separate shafts. The connecting rod bearings are removable and interchangeable, the bushings being die cast under hydraulic pressure, which feature facilitates repairs. All parts of the motor are made in standard design and size.

Mechanical, positive feed lubrication, with oil tubes running to each cylinder and all bearings of the crank shaft, is furnished. The ignition is a double system using the Bosch magneto and the Exide storage battery (Electric Storage Battery Co., Philadelphia, Pa.) with mica plugs. The motor is water-cooled. Special radiators, made of spiral tubing, are carried underneath the motor immediately back of the pilot. The tank has a capacity of 50 gals. of water, which is said to provide amply against overheating, even in the most severe service. The carburetor is automatic. Gasolene flows by gravity from a tank which contains about 5 gals., which under ordinary circumstances is said to be sufficient for running the car from 300 to 400 miles. Double-drive friction transmission, designed for driving the car either forward or backward at any speed, is used. The frame is of the three-point suspension type, designed to eliminate any disalinement of the mechanism and as much of the vibration of the car as possible. The drive is obtained through a Morse silent chain with 2-in. face, and double side chains are used. These cars are usually geared for a speed of 30 miles per hour on level track, with full load, with the motor running at normal speed.

The frame is of all-steel construction, the main sills being heavy channel sections securely braced with cross-sections and securely riveted. The wheels are 28 in. in diameter, of high grade steel with standard M.C.B. flange and tread. The standard wheel base is 8 ft. 6 in., but may be made of any desired length. The axle bearings are of the roller type and each bearing is fitted with a good sized grease cup. The rear platform is mounted on a separate frame, which extends from the main frame of the car. The available standing room space on this platform measures 26 in. x 68 in.

It is claimed that records of performance show that the average consumption of gasolene is approximately one gallon per 8 to 10 miles. On this basis, a car running 100 miles per day can be operated at a cost of about $2 for fuel and lubricating oil. It is also claimed that these cars in service making as many as 110 miles per day average less than 7 cents per mile for lubricating oil, repairs, wages and maintenance charges.

This car was made by the Stover Motor Car Co., Freeport, Ill.

Crosby Wire Rope Clip.

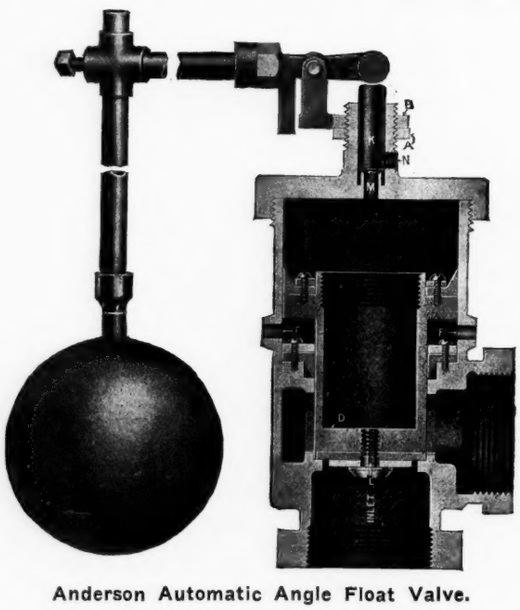
The wire rope clip shown herewith has a die-forged grip, or socket, made of Bessemer steel of an ultimate strength of 55,000 lbs. per square inch. The fingers of the socket are made extra long so that both layers of the rope forming the loop are gripped to provide maximum resistance against slipping. The maker claims that tests have shown this clip—the Crosby—to have a superior grip to any other, and fewer are therefore required for a safe fastening; two clips are recommended at each loop for running ropes, and three or more for guys. The clips are galvanized. They are made by the American Hoist & Derrick Co., St. Paul, Minn.

Crosby Wire Rope Clip.

Anderson Automatic Float Valve.

The accompanying illustration shows a cross section of an Anderson automatic angle float valve. These valves, for either high or low pressure, are made of bronze in both angle and globe design and may be used submerged or above the water.

The valve is placed in the supply pipe between the source and the receiving tank. Water passes through the valve by the inlet at the bottom in the angle type illustrated. A small drilled port, through the screw which holds the gasket follower, allows water to flow into the interior of the valve. When the water rises to the desired height in the receiving tank, the float closes the port M, through which water has been flowing into the auxiliary discharge pipe, which is tapped into the valve at N. When this discharge flow is closed off, the pressure on the upper surface of the valve overbalances that acting on the single lower face, and the valve closes. It is held closed until the



Anderson Automatic Angle Float Valve.

float is allowed to fall, when the valve closing the port M is again opened and the exhaust, or flow through the auxiliary pipe at N, again begins.

The water in the interior of the valve acts as a cushion in opening, and as the valve travels upward, air is drawn into the air space in the sides of the valve body through the ports F and F. This air forms a cushion when the valve is closing. Rubber cups and disc are fitted at all the contact surfaces where watertight joints are required. The float lever can be placed at any angle by adjustment of the lock-nut A.

These valves are made by the Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.